Version 8.0

NN46110-316 03.01
318022-D Rev 01
13 October 2008
Standard
600 Technology Park Drive
Billerica, MA 01821-4130

Nortel VPN Router Installation — VPN Router 1750

NORTEL

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EN 55 022 statement

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Warning: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

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Preface

The Nortel VPN Router 1750 is part of the Nortel VPN Router product family. The Nortel VPN Routers support secure, reliable IP VPNs in a single, integrated hardware device. Throughout this document, the VPN Router is also referred to as the gateway.

This document provides instructions to install the VPN Router 1750 for the first time and to replace field replaceable units (FRU). This document also provides some initial configuration information and includes technical specifications for the VPN Router 1750.

For complete information about how to configure and monitor the VPN Router 1750, see the documentation on the software CD that Nortel shipped with the router.

Before you begin

This guide is intended for qualified service personnel who install the VPN Router 1750 for the first time or who need to install or replace the following field replaceable units (FRU):

- Local Area Network (LAN), Wide Area Network (WAN), and serial interface cards
- VPN Accelerator cards (VPN Router Security Accelerator [CSA] card and Hardware accelerator card)
- Secure Sockets Layer (SSL) VPN Module 1000
- dual inline memory modules (DIMM)

Before you install the VPN Router 1750, use standard cable system practices to install all the network wiring on the premises.

Text conventions

This guide uses the following text conventions:

angle brackets (< >)	Indicates that you choose the text to enter based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is **ping** *<ip_address>*, you enter **ping 192.32.10.12**
bold Courier text	Indicates command names, options, and text that you need to enter. Example: Use the **show health** command. Example: Enter **terminal paging** {**off** | **on**}.
braces ({ })	Indicates required elements in syntax descriptions where more than one option exists. You must choose only one option. Do not type the braces when you enter the command. Example: If the command syntax is **ldap-server source {external | internal}**, you must enter either **ldap-server source external** or **ldap-server source internal**, but not both.
brackets ([ ])	Indicates optional elements in syntax descriptions. Do not type the brackets when you enter the command. Example: If the command syntax is **show ntp [associations]**, you can enter either **show ntp** or **show ntp associations**. Example: If the command syntax is **default rsvp** [**token-bucket** {**depth** | **rate**}], you can enter **default rsvp**, **default rsvp token-bucket depth**, or **default rsvp token-bucket rate**.
ellipsis points (. . .)	Indicates that you repeat the last element of the command as needed. Example: If the command syntax is **more disk***n***:***<directory>***/...***<file_name>***, you enter **more** and the fully qualified name of the file.

italic text	Indicates new terms, book titles, and variables in command syntax descriptions. Where a variable is two or more words, an underscore connects the words. Example: If the command syntax is **`ping`** <*`ip_address`*>, *`ip_address`* is one variable and you substitute one value for it.
`plain Courier text`	Indicates system output, for example, prompts and system messages. Example: `File not found.`
separator (,)	Shows menu paths. Example: Choose **Status**, **Health Check**.
vertical line (|)	Separates choices for command keywords and arguments. Enter only one choice. Do not type the vertical line when you enter the command. Example: If the command syntax is **`terminal paging`** {**`off`** | **`on`**}, you enter either **`terminal paging off`** or **`terminal paging on`**, but not both.

Related publications

For more information about the Nortel VPN Router 1750, see the following publications:

- Release notes provide the most recent information, including brief descriptions of the new features, problems fixed in this release, and known problems and workarounds.
- *Nortel VPN Router 1750 Configuration — Client* (NN46110-306) provides information to install and configure client software for the VPN Router 1750.
- *Nortel VPN Router 1750 Configuration — TunnelGuard* (NN46110-307) provides information to configure and use the TunnelGuard feature.
- *Nortel VPN Router Upgrades — Server Software Release 8.0* (NN46110-407) provides information to upgrade the server software to the most recent release.
- *Nortel VPN Router Installation and Upgrade — Client Software Release 8.01* (NN46110-409) provides information to upgrade the Nortel VPN Client to the most recent release.
- *Nortel VPN Router 1750 Configuration — Basic Features* (NN46110-500) introduces the product and provides information about initial setup and configuration.
- *Nortel VPN Router 1750 Configuration — SSL VPN Services* (NN46110-501) provides instructions to configure services on the SSL VPN Module 1000, including authentication, networks, user groups, and portal links.
- *Nortel VPN Router Configuration — Advanced Features* (NN46110-502) provides configuration information for advanced features such as the Point-to-Point Protocol (PPP), Frame Relay, and interoperability with other vendors.
- *Nortel VPN Router 1750 Configuration — Tunneling Protocols* (NN46110-503) provides configuration information for the tunneling protocols IPsec, Layer 2 Tunneling Protocol (L2TP), Point-to-Point Tunneling Protocol (PPTP), and Layer 2 Forwarding (L2F).
- *Nortel VPN Router 1750 Configuration — Routing* (NN46110-504) provides instructions to configure the Border Gateway Protocol (BGP), Routing Information Protocol (RIP), Open Shortest Path First (OSPF), Virtual Router Redundancy Protocol (VRRP), Equal Cost Multipath (ECMP), routing policy services, and client address redistribution (CAR).
- *Nortel VPN Router 1750 Using the Command Line Interface* (NN46110-507) provides syntax, descriptions, and examples for the commands that you can use from the command line interface (CLI).

- *Nortel VPN Router 1750 Configuration — Firewalls, Filters, NAT, and QoS* (NN46110-508) provides instructions to configure the Stateful Firewall and VPN Router 1750 interface and tunnel filters.
- *Nortel VPN Router 1750 Security — Servers, Authentication, and Certificates* (NN46110-600) provides instructions to configure authentication services and digital certificates.
- *Nortel VPN Router 1750 Troubleshooting — Server* (NN46110-602) provides information about system administrator tasks such as recovery, and instructions to monitor VPN Router status and performance. This document provides troubleshooting information and event log messages.
- *Nortel VPN Router Administration* (NN46110-603) provides information about system administrator tasks such as backups, file management, serial connections, initial passwords, and general network management functions.
- *Nortel VPN Router 1750 Troubleshooting — Client* (NN46110-700) provides information to troubleshoot installation and connectivity problems with the Nortel VPN Client.

Printed technical manuals

To print selected technical manuals and release notes for free, directly from the Internet, go to www.nortel.com/documentation, find the product for which you need documentation, and then locate the specific category and model or version for your hardware or software product. Use Adobe Reader to open the manuals and release notes, search for the sections you need, and then print them on most standard printers. Go to the Adobe Systems Web site at www.adobe.com to download a free copy of the Adobe Reader.

How to get help

This section explains how to get help for Nortel products and services.

Finding the most recent updates on the Nortel Web site

The content of this documentation is current at the time the product is released. To check for updates to the most recent documentation and software for VPN Router 1750, click one of the following links.

Link	Web site
Most recent software	Nortel page for **VPN Router** software located at support.nortel.com/go/main.jsp?cscat=SOFTWARE&poid=12325
Most recent documentation	Nortel page for **VPN Router** documentation located at support.nortel.com/go/main.jsp?cscat=DOCUMENTATION&poid=12325

Getting help from the Nortel Web site

The best way to get technical support for Nortel products is from the Nortel Technical Support Web site:

www.nortel.com/support

This site provides quick access to software, documentation, bulletins, and tools to address issues with Nortel products. From this site, you can perform the following activities:

- download software, documentation, and product bulletins
- search the Technical Support Web site and the Nortel Knowledge Base for answers to technical issues
- sign up for automatic notification of new software and documentation for Nortel equipment
- open and manage technical support cases

Getting help over the phone from a Nortel Solutions Center

If you do not find the information you require on the Nortel Technical Support Web site, and you have a Nortel support contract, you can also get help over the phone from a Nortel Solutions Center.

In North America, call 1-800-4NORTEL (1-800-466-7835).

Outside North America, go to the following Web site to obtain the phone number for your region:

www.nortel.com/callus

Getting help from a specialist by using an Express Routing Code

To access some Nortel Technical Solutions Centers, you can use an Express Routing Code (ERC) to quickly route your call to a specialist in your Nortel product or service. To locate the ERC for your product or service, go to the following Web site:

www.nortel.com/erc

Getting help through a Nortel distributor or reseller

If you purchased a service contract for your Nortel product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller.

New in this release

The following section details what's new in *Nortel VPN Router Installation—VPN Router 1750* (NN46110-316) for Release 8.0:

- "Features" on page 19
- "Other changes" on page 19

Features

See the following section for information about feature changes:

- "Models" on page 19

Models

Starting with Release 8.0, the Nortel VPN Router 1750 is available in two 128-bit models. For more information, see "Description of the Nortel VPN Router 1750" on page 37.

Other changes

For information that is not feature related, see the following section:

- "Document changes" on page 19

Document changes

This document is changed to comply with Nortel writing conventions.

Chapter 1
Cables and power

This chapter provides information about how to connect communications cables and the power cord to the VPN Router 1750.

Caution: Before you plug the power cord into the outlet, connect the cables to the built-in Ethernet ports and to the interfaces on the option cards installed in the VPN Router 1750.

This chapter contains the following topics:

- "Connecting communications cables" on page 22
- "Connecting the power cord" on page 24
- "Verifying a successful installation" on page 25
- "LEDs" on page 26

Caution: You must route the cabling for all wide area network (WAN), local area network (LAN), and serial connections inside the building environment.

Connecting communications cables

Gather the cables to attach to the VPN Router 1750.

"Interfaces and cables for the Nortel VPN Router 1750" on page 22 lists the system ports and the ports on the optional interface cards that you can install in the VPN Router 1750. The following table also indicates whether you can obtain cables for the ports from Nortel.

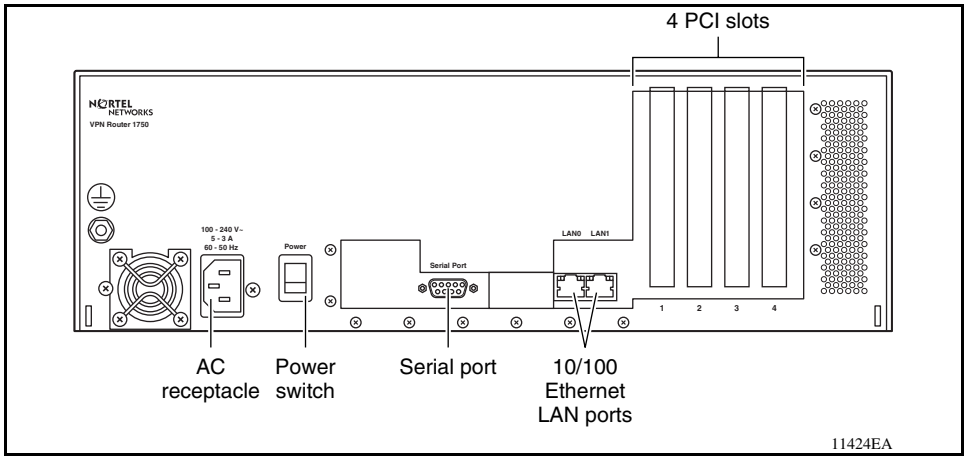
Table 1 Interfaces and cables for the Nortel VPN Router 1750

	Cable available from Nortel		
Interface	**Included**	**Ordered separately**	**Contact supplier**
10/100BASE-TX Ethernet system ports			X
Serial port	X		
10/100BASE-TX Ethernet			X
1000BASE-T (1000 GT) Ethernet			X
1000BASE-T (1000 MT) Ethernet (copper)			X
1000BASE-SX Ethernet (fiber)		Order either the LC-to-LC cable or the LC-to-SC cable.	
56/64K Channel Service Unit (CSU)/ Data Service Unit (DSU) WAN			X
Asymmetric Digital Subscriber Line (ADSL) WAN	X		
Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI)			X
V.90 modem	X		
T1/E1 CSU/DSU WAN			X
Quad T1/E1 CSU/DSU WAN			X
Single V.35/X.21 WAN		Order either the V.35 cable or the X.21 cable.	
Dual V.35 WAN	X		
HSSI WAN	X		

For information about the connectors and cable pinouts, see Appendix A, "Technical specifications," on page 69.

"Rear view of the Nortel VPN Router 1750" on page 23 shows the back of the VPN Router 1750. All interface cables and the power cord attach to the rear of the gateway.

Figure 1 Rear view of the Nortel VPN Router 1750



Connect the interface cables to the VPN Router 1750 in the following order:

1. Connect the 10/100BASE-TX RJ-45 cables to the built-in 10/100BASE-TX Ethernet LAN ports on the gateway.
2. If you plan to connect a terminal or PC to the gateway, connect the serial cable that ships with the VPN Router 1750 to the serial port.
3. Connect all other cables to the ports on the installed interface cards.

   If you ordered optional interface cards, connect the cables for these interfaces to the ports.

Connecting the power cord

You must order the power cord for the VPN Router 1750 separately.

Caution: Risk of equipment damage
Do not modify or use the AC power cord if it is not the exact type that is required for your power outlet.

The power cord must meet the requirements described in "Power cord requirements" on page 24.

Table 2 Power cord requirements

Requirement	Description
Current rating	The power cord must be rated for the available AC voltage and must have a current rating that is at least 125 percent of the current rating of the gateway (5 A @ 100 Voltage Alternating Current (VAC) or 3 A @ 240 VAC).
Certification	The power cord must have certification marks from an acceptable regional agency.
Cord length and flexibility	The power cord must be less than 4.5 meters (14.7 feet) long. The cord must be a flexible harmonized cord or VDE-certified cordage to comply with the gateway safety certifications.
Power supply connector	The connector that you plug into the AC receptacle on the gateway must be an IEC 320, Sheet C13 female.
Wall outlet connector	The power cord must terminate in a male plug with appropriate grounding.

To connect the power cord and turn on the system power, perform the following steps:

1. Connect the power cord to the AC receptacle on the back of the gateway, as shown in "Rear view of the Nortel VPN Router 1750" on page 23.
2. Connect the power cord to the power outlet.

Caution: Risk of equipment damage
Protect the VPN Router 1750 by plugging it into a surge suppressor.

3 Press and release the power switch on the rear of the VPN Router 1750, and wait for the gateway to start.

Verifying a successful installation

After you connect the gateway to the power source and turn it on, you can verify a successful installation by checking the light emitting diodes (LED) on the front panel. For more information, see "Front panel LEDs" on page 26.

The following sequence of LEDs occurs:

1 The power LED (the Nortel logo) lights blue.

2 The Alert LED lights red and the Boot/Ready LED lights green.

3 When the gateway begins the boot sequence, the Boot/Ready LED lights yellow and the Alert LED turns off.

4 After the boot process is complete, the Boot/Ready LED lights green, which indicates that the gateway is operational.

5 The Alert LED lights yellow because the gateway is not configured.

   For a newly installed VPN Router 1750, a yellow Alert LED does not indicate an alarm condition. After you configure the gateway, the Alert LED turns off. For more information, see Chapter 4, "Management IP interface configuration," on page 61.

If the LEDs on the front panel light in the preceding sequence, the installation is successful. If the LEDs do not light in the preceding sequence, check that you correctly installed the bezel on the gateway and that you properly attached the power cord to the power supply. For more information, see "Connecting the power cord" on page 24.

If the VPN Router 1750 still does not start, contact your local Nortel Technical Solutions Center. For more information, see "How to get help" on page 15.

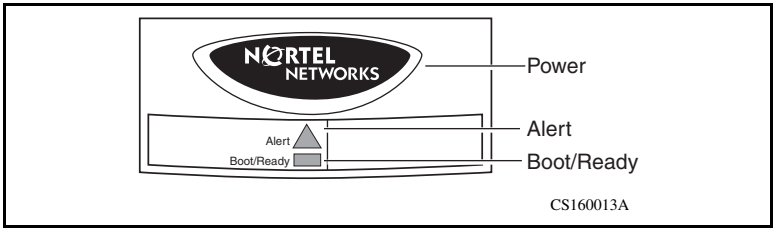
LEDs

This section describes the LEDs on the front panel of the VPN Router 1750 and on the interface cards that use LEDs. You can confirm that you properly connect the LAN and WAN interface cables by examining the LEDs.

Front panel LEDs

The front panel of the VPN Router 1750 has a lighted Nortel logo and two LEDs as shown in the following figure. These LEDs indicate the status of the VPN Router 1750.

Figure 2 Front panel LEDs



The following table describes the LEDs on the VPN Router 1750 front panel.

Table 3 Front panel LED indicators

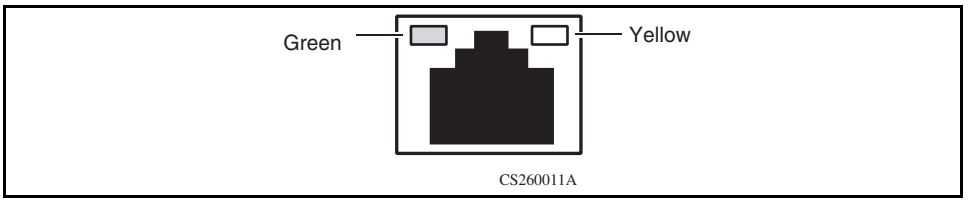
LED	Indicator	Description
Power (Nortel logo)	On	The gateway receives AC power.
	Off	The gateway does not receive AC power.
Alert	Yellow	A nonfatal alarm condition exists. The health check display describes the yellow alert condition.
	Red	A serious alarm condition exists that requires attention. A red alert usually indicates a hardware error. The health check display describes the red alert condition.
Boot/Ready	Yellow	The gateway is starting and is in a nonready state.
	Green	The boot process is complete, and the gateway is in a state of readiness.

For more information about the health check, event log, and system log, see *Nortel VPN Router Troubleshooting — Server* (NN46110-602).

LEDs on the system 10/100BASE-TX Ethernet ports

Each of the 10/100BASE-TX Ethernet ports on the rear of the VPN Router 1750 has two LEDs; see "LEDs on the system 10/100BASE-TX Ethernet ports" on page 27.

Figure 3 LEDs on the system 10/100BASE-TX Ethernet ports



The following table describes the LEDs on the system 10/100BASE-TX Ethernet ports.

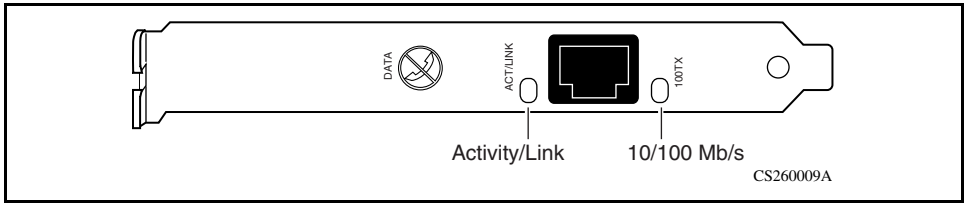
Table 4 LED indicators on the system 10/100BASE-TX Ethernet ports

LED	Indicator	Description
Green	On	The LAN port operates at 100 Megabits per second (Mb/s).
	Off	The LAN port operates at 10 Mb/s.
Yellow	On	The cable connections between the LAN port and the hub are good.
	Off	The cable connections between the LAN port and the hub are faulty.
	Flashing	The LAN port is sending or receiving network data. The frequency of the flashes increases with increased traffic.

10/100BASE-TX Ethernet interface card LEDs

The following figure shows the LEDs on the 10/100BASE-TX Ethernet interface card.

Figure 4 LEDs on the 10/100BASE-TX Ethernet interface card



The following table describes the LEDs on the 10/100BASE-TX Ethernet interface card.

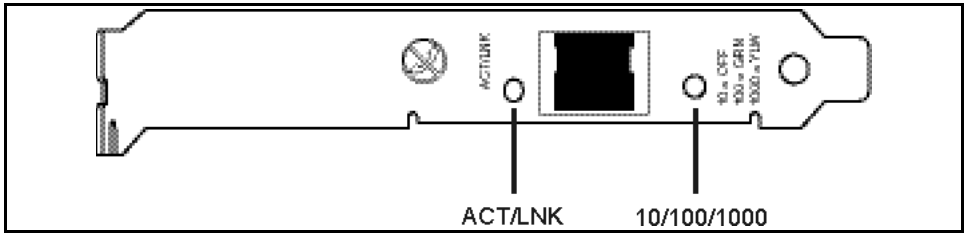
Table 5 LED indicators on the 10/100BASE-TX Ethernet interface card

LED	Indicator	Description
ACT/LINK	Steady green or flashing green	The card is sending or receiving network data. The frequency of the flashes increases with increased traffic.
	Off	The card is not sending or receiving data.
10/100TX	Green	The port operates at 100 Mb/s.
	Off	The port operates at 10 Mb/s.

1000BASE-T (1000 GT) Ethernet interface card LEDs

The following figure shows the LEDs on the 1000BASE-T (1000 GT) Ethernet interface card.

Figure 5 LEDs on the 1000BASE-T (1000 GT) Ethernet interface card



The following table describes the LEDs on the 1000BASE-T (1000 GT) Ethernet interface card.

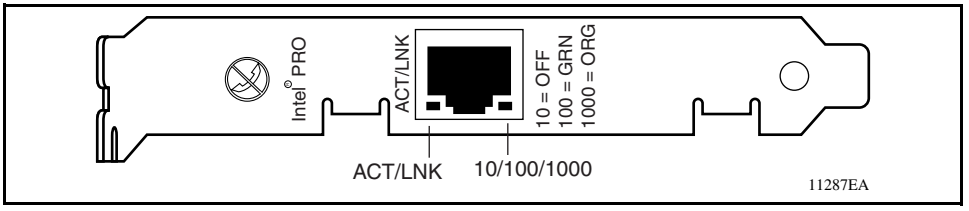
Table 6 LED indicators on the 1000BASE-T (1000 GT) Ethernet interface card

LED	Indicator	Description
ACT/LINK	Steady green	The port connects to a valid link partner.
	Flashing green	The card is sending or receiving network data. The frequency of the flashes increases with increased traffic.
	Off	The card is not sending or receiving data.
10/100/1000	Yellow	The port operates at 1000 Mb/s.
	Green	The port operates at 100 Mb/s.
	Off	The port operates at 10 Mb/s.

1000BASE-T (1000 MT) Ethernet interface card LEDs

The following figure shows the LEDs on the 1000BASE-T (1000 MT) Ethernet interface card.

Figure 6 LEDs on the 1000BASE-T (1000 MT) Ethernet interface card



The following table describes the LEDs on the 1000BASE-T Ethernet interface card.

Table 7 LED indicators on the 1000BASE-T (1000 MT) Ethernet interface card

LED	Indicator	Description
ACT/LNK	Steady green	The port connects to a valid link partner.
	Flashing green	The LAN port is sending or receiving network data.
	Off	The port does not link to a valid partner.

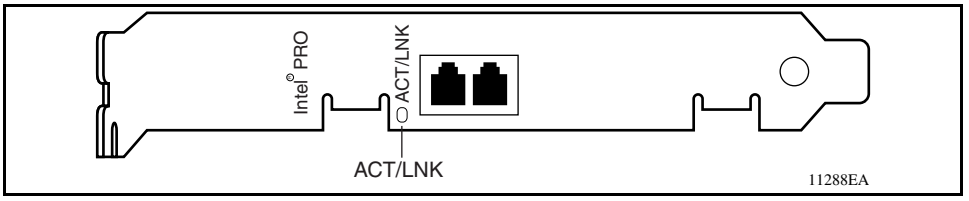
Table 7 LED indicators on the 1000BASE-T (1000 MT) Ethernet interface card

LED	Indicator	Description
10/100/1000	Off	The LAN port operates at 10 Mb/s.
	Green	The LAN port operates at 100 Mb/s.
	Orange	The LAN port operates at 1000 Mb/s.

1000BASE-SX Ethernet interface card LED

The following figure shows the LED on the 1000BASE-SX Ethernet interface card.

Figure 7 LED on the 1000BASE-SX Ethernet interface card



The following table describes the LED on the 1000BASE-SX Ethernet interface card.

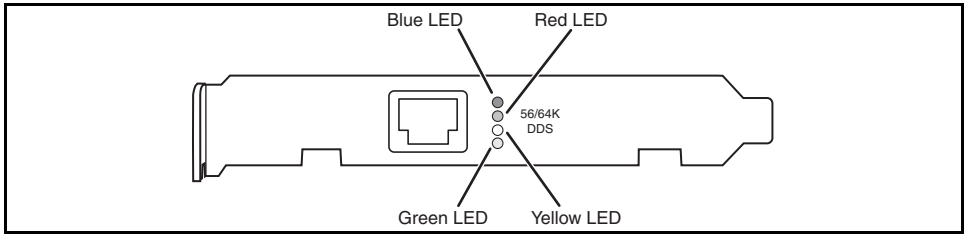
Table 8 LED indicator on the 1000BASE-SX Ethernet interface card

LED	Indicator	Description
ACT/LNK	Steady green	The port connects to a valid link partner.
	Flashing green	The LAN port is sending or receiving network data.
	Off	The port does not link to a valid partner.

56/64K CSU/DSU WAN interface card LEDs

The following figure shows the LEDs on the 56/64K CSU/DSU WAN interface card.

Figure 8 LEDs on the 56/64K CSU/DSU WAN interface card



The following figure describes the LEDs on the 56/64K CSU/DSU WAN interface card.

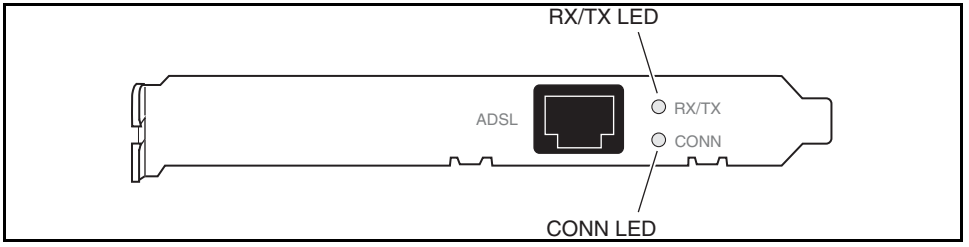
Table 9 LED indicators on the 56/64K CSU/DSU WAN interface card

LED	Description
Blue	The blue alarm LED lights after the interface card detects a digital data service (DDS) out-of-frame condition on the receive signal.
Red	The red alarm LED lights after the interface card detects a DDS loss-of-signal or loss-of-frame condition on the receive signal.
Yellow	The yellow alarm LED lights after the interface card detects a DDS out-of-service condition on the receive signal. This LED indicates that the far-end equipment detects a local loss of service (LOS) or loss of frame (LOF) condition.
Green	The green LED lights after the interface card receives valid DDS signal and framing. This LED indicates normal operation of the card.
All LEDs off	The port is disabled.

ADSL WAN interface card LEDs

The following figure shows the LEDs on the asymmetric digital subscriber line (ADSL) WAN interface card.

Figure 9 LEDs on the ADSL WAN interface card



The following table describes the LEDs on the ADSL WAN interface card.

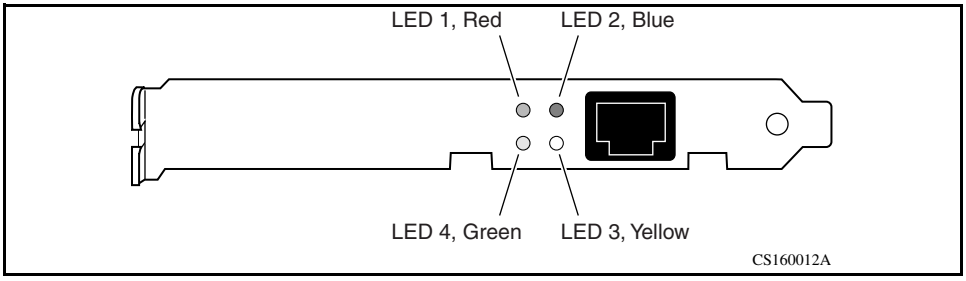
Table 10 LED indicators on the ADSL WAN interface card

CONN LED	Tx/Rx LED	Description
Steady green	Steady green	The ADSL interface card is not initialized; the software driver is not installed.
Off	Off	The ADSL interface card is initialized, but has not established a link with the ADSL network.
Flashing green	Off	The ADSL interface card is attempting to establish a link with the ADSL network.
Steady green	Off	The ADSL interface card has established a link with the ADSL network.
Steady green	Flashing green	The ADSL interface card is sending or receiving network data. The LED can appear dim.

T1/E1 CSU/DSU WAN interface card LEDs

The following figure shows the LEDs on the T1/E1 CSU/DSU WAN interface card.

Figure 10 LEDs on the T1/E1 CSU/DSU WAN interface card



The following table describes the LEDs on the T1/E1 CSU/DSU WAN interface card.

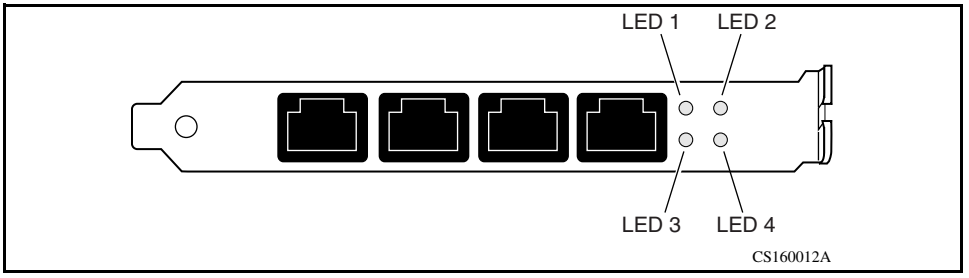
Table 11 LED indicators on the T1/E1 CSU/DSU WAN interface card

LED	Indicator	Description
LED 1	Red	The red alarm LED lights after a loss-of-signal or out-of-frame condition is detected on the receive signal.
LED 2	Blue	The blue alarm LED lights after receiving an upstream failure denoted by an alarm indication signal.
LED 3	Yellow	The yellow alarm LED lights when the far-end equipment is in the red alarm condition.
LED 4	Green	The green LED lights when the condition is normal operation.

Quad T1/E1 CSU/DSU WAN interface card LEDs

The following figure shows the LEDs on the quad T1/E1 channel service unit/ digital service unit (CSU/DSU) WAN interface card.

Figure 11 LEDs on the quad T1/E1 CSU/DSU WAN interface card



The following table describes the LEDs on the quad T1/E1 CSU/DSU WAN interface card.

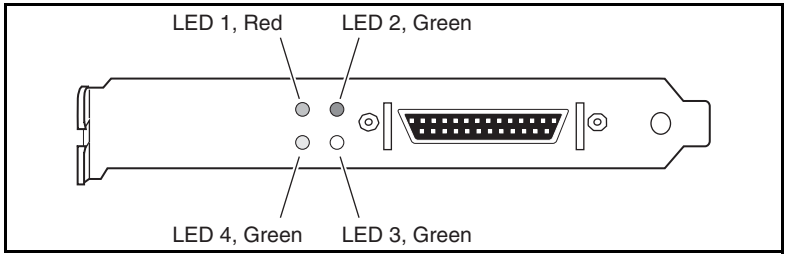
Table 12 LED indicators on the quad T1/E1 CSU/DSU WAN interface card

LED	Indicator	Description
LED 1	Off	Port 1 is disabled.
	On	Port 1 is enabled and operating normally.
	Flashing	Port 1 is enabled and in an alarm state (red, yellow, or blue).
LED 2	Off	Port 2 is disabled.
	On	Port 2 is enabled and operating normally.
	Flashing	Port 2 is enabled and in an alarm state (red, yellow, or blue).
LED 3	Off	Port 3 is disabled.
	On	Port 3 is enabled and operating normally.
	Flashing	Port 3 is enabled and in an alarm state (red, yellow, or blue).
LED 4	Off	Port 4 is disabled.
	On	Port 4 is enabled and operating normally.
	Flashing	Port 4 is enabled and in an alarm state (red, yellow, or blue).

Single V.35/X.21 WAN interface card LEDs

The following figure shows the LEDs on the single V.35/X.21 WAN interface card.

Figure 12 LEDs on the single V.35/X.21 WAN interface card



The following table describes the LEDs on the single V.35/X.21 WAN interface card.

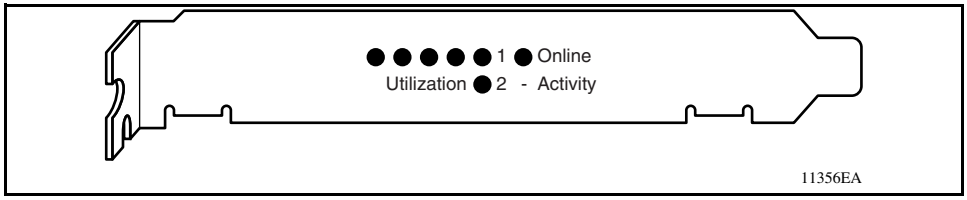
Table 13 LED indicators on the single V.35/X.21 WAN interface card

LED	Indicator	Description
LED 1	Red	No external transmit clock source is available.
LED 2	Green	The signals CDC and DSR are on between the DSU and the adapter. LED 2 detects receive link status.
LED 3	Green	The power to the adapter is on and the onboard microcode is loaded.
LED 4	Green	A cable is detected.

SSL VPN Module 1000 LEDs

The following figure shows the LEDs on the Secure Sockets Layer (SSL) VPN Module 1000.

Figure 13 LEDs on the SSL VPN Module 1000



The following table describes the LEDs on the SSL VPN Module 1000.

Table 14 LED indicators on the SSL VPN Module 1000

LEDs	Indicator	Description
Online	Steady green	The SSL VPN Module 1000 operates normally.
	Yellow	A reset occurred on the SSL VPN Module 1000.
	Off	The SSL VPN Module 1000 does not receive power.
Activity LED 1	Steady green	The SSL VPN Module 1000 operates normally.
	Flashing green	Activity occurs on the SSL VPN Module 1000.
	Yellow	A reset occurred on the SSL VPN Module 1000.
Activity LED 2	—	Not used. This LED often lights, but it has no meaning.
Utilization (4 LEDs)	Steady green	Together, these four LEDs indicate an approximate average level of CPU utilization. When one LED lights, CPU utilization is approximately 25%; when two LEDs light, CPU utilization is approximately 50%.
	Blinking in unison	The SSL VPN Module 1000 is idle.

Chapter 2
Nortel VPN Router 1750 chassis

This chapter describes how to install the VPN Router 1750 chassis.

Note: Before you install the chassis, use standard cable system practices to install all network wiring on the premises.

This chapter contains the following topics

- "Description of the Nortel VPN Router 1750" on page 37
- "Preparation" on page 38
- "Chassis installation" on page 41

Description of the Nortel VPN Router 1750

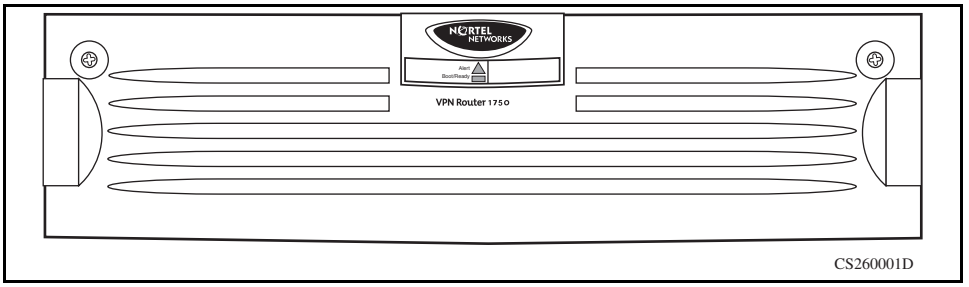
With the VPN Router 1750, you can supply scalable, secure, and robust Internet Protocol (IP) virtual private networks (VPN) across the public data network. The VPN Router 1750 provides routing, firewall, bandwidth management, encryption, authentication, and data integrity services to ensure secure tunneling across IP networks and the Internet.

The VPN Router 1750 is available in the following two models:

- VPN Router 1750 with 50 tunnels (128-bit)
- VPN Router 1750 with 500 tunnels (128-bit)

The following figure shows the front view of the Nortel VPN Router 1750.

Figure 14 Front view of the Nortel VPN Router 1750



The VPN Router 1750 chassis provides the following physical features:

- two 10/100 Ethernet local area network (LAN) ports on the base system
- one serial port for out-of-band management of the VPN Router 1750
- four expansion peripheral component interconnect (PCI) slots that can contain interface cards, a VPN Accelerator card (VPN Router Security Accelerator [CSA] card or Hardware Accelerator card), and the Secure Sockets Layer (SSL) VPN Module 1000
- a memory of 128 Megabytes (MB) that you can upgrade to 256 MB

Preparation

Before you begin the installation, verify the following items:

- The shipment is complete and undamaged.
- You have the cables, tools, and other equipment that you need.
- Your installation site meets the physical, electrical, and environmental requirements.

The following sections provide information to help you prepare for installation.

Shipment contents

In addition to the gateway and this guide, the shipping container for the VPN Router 1750 contains a number of hardware accessories and other items.

Note: Unless you specifically ordered a power cable, Nortel does not ship one with the VPN Router 1750.

Table 15 Items shipped with the Nortel VPN Router 1750

Quantity	Item	Purpose
1	Rack mount shelf	Supports the chassis in the equipment rack
4	10-32 panhead screws	Secures the rack-mount shelf and the chassis to the equipment rack
4	10-32 panhead cage nuts	Secures the rack-mount shelf and the chassis if the equipment rack does not have threaded rail holes
4	Rubber feet	Installs the chassis on a surface
1	Antistatic wrist strap	Directs the discharge of static electricity from your body to the chassis to prevent damage to sensitive electronic components
1	Molded serial cable DB9/DB25-to-DB9/DB25	Connects the VPN Router 1750 to a PC or to a local terminal
1	*Nortel VPN Router Installation — VPN Router 1750* (NN46110-316) (this book)	Provides instructions to install the chassis and hardware options
1	Recovery diskette	Restores the software image and file system
1	VPN Router software kit	Contains Nortel VPN Router 1750 software and documentation on a CD
1	VPN client kit	Contains Nortel VPN Client software and documentation on a CD
1	Sheet of labels	Records the IP address (apply to front bezel)

Inspect all items for shipping damage. If you detect damage, do not install the VPN Router 1750. Call the Nortel Technical Solutions Center in your area.

Additional equipment

You need items that do not ship in the VPN Router 1750 shipping container. Before you begin the installation, ensure that you have all the cables, tools, and other equipment that you need.

Cables

You need cables that do not ship in the VPN Router 1750 shipping container. For more information about which cables ship and which ones you can order, see "Connecting communications cables" on page 22. If you do not have the proper cables, contact your network administrator.

Hardware to mount the chassis in an equipment rack

To install the VPN Router 1750 in an equipment rack, you need a Phillips screwdriver and an equipment rack that meets the following specifications:

- heavy-duty steel construction
- width of 19 in. (48.26 cm) and depth of 24 in. (60.96 cm)
- Electronic Industries Association (EIA) standard hole-spacing

If the rack does not have threaded rail holes, you must use the cage nuts that ship with the VPN Router 1750.

Site requirements

The installation site must provide sufficient free space around the VPN Router 1750 to ensure proper ventilation and service access. For information about the physical, electrical, and environmental requirements for the VPN Router 1750, see Appendix A, "Technical specifications," on page 69.

Chassis installation

To install the VPN Router 1750, perform one of the following procedures:

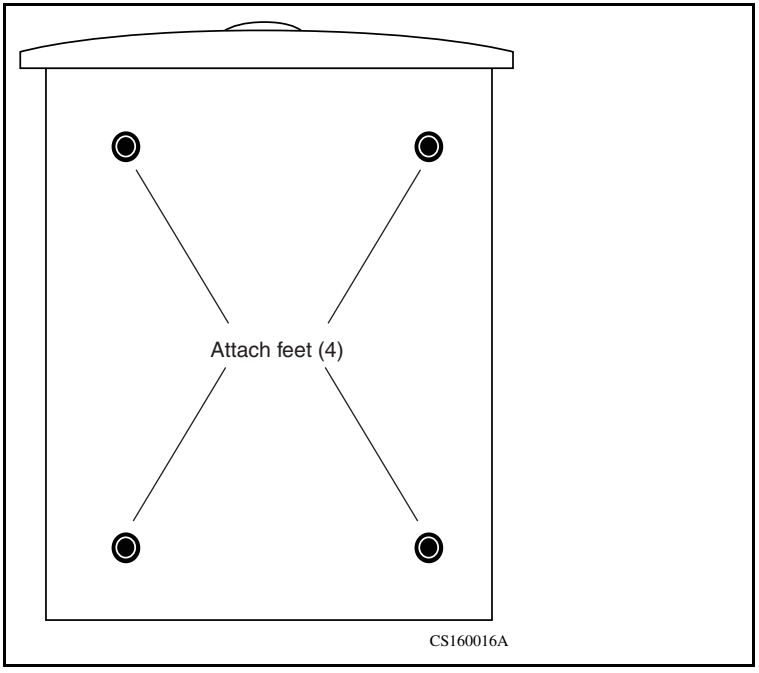
- Position the chassis on a flat, sturdy, horizontal surface.
- Mount the chassis in a standard equipment rack. For more information, see "Installing the chassis in an equipment rack" on page 42.

Installing the chassis on a flat surface

If you decide to place the VPN Router 1750 on a flat surface, make sure that the surface is large enough for the gateway, and sturdy enough to support the combined weight of the VPN Router 1750 and the cables that you attach to it.

The VPN Router 1750 accessory kit includes four rubber feet that you can attach to the bottom of the gateway. The following figure shows the placement of the rubber feet.

Figure 15 Placement of rubber feet on the bottom of the chassis



Installing the chassis in an equipment rack

To mount the VPN Router 1750 in an equipment rack, you need the following equipment:

- standard 19-inch equipment rack
- four screws (supplied with the chassis)
- four cage nuts (supplied with the chassis) if the rack does not have threaded rail holes
- a #2 Phillips screwdriver

Rack-mount recommendations

When you mount the chassis in the equipment rack, observe the following standard recommendations:

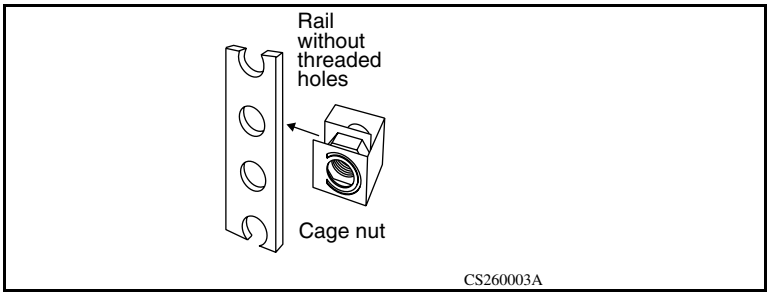
- The maximum recommended ambient temperature is 40°C (104°F). Ensure that the internal temperature of the rack does not exceed 40°C (104°F).
- Do not block the power supply vents or otherwise restrict air flow when you install the chassis in the rack.
- Stabilize the rack so that it does not tip over under the weight of the gateway and other devices.
- Before you install and turn on the gateway, ensure that the electrical branch circuits can handle the VPN Router 1750 and other units in the rack.
- Maintain a reliable earth-ground path in the rack system. You must connect the gateway to an earth ground.

Attaching the shelf in the equipment rack

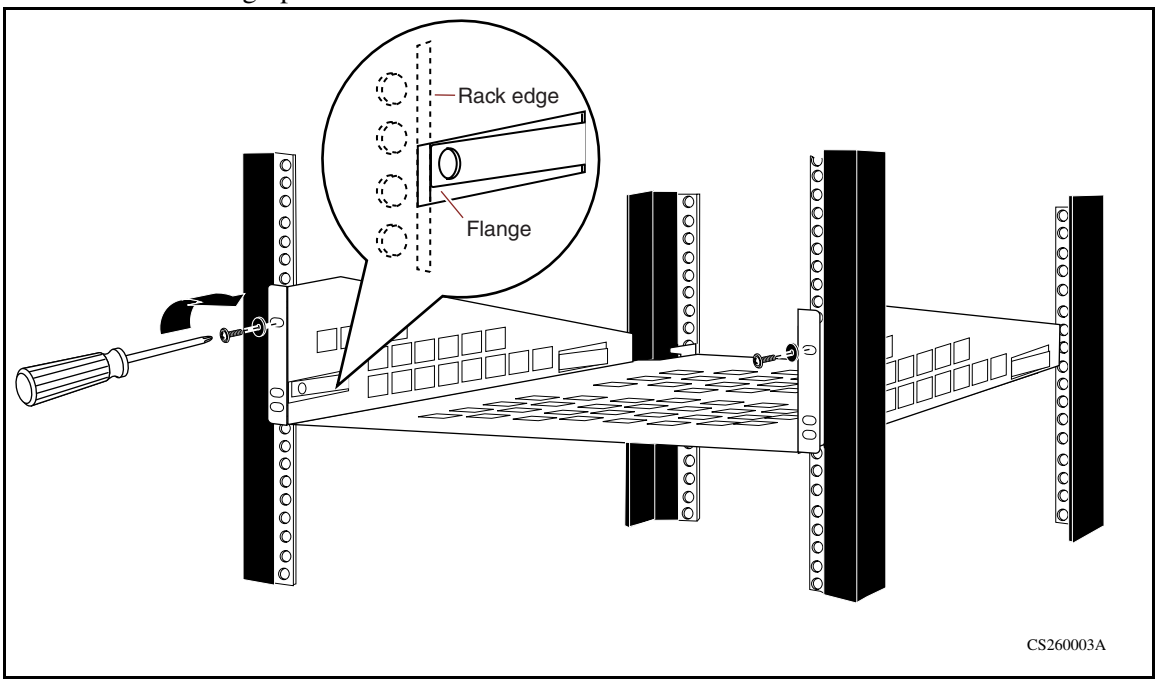
The VPN Router 1750 ships with a rack-mount shelf to support the chassis in the equipment rack.

To attach the shelf to the inside of the equipment rack, perform the following steps:

1 Attach a cage nut in four locations at the front of the rack, if the holes in the vertical supports of the rack are not threaded.



2 Position the rack-mount shelf inside the rack as shown in the following graphic.



3 Align the holes in the shelf with holes in the front of the rack.

4 Snap the support flange into place. Ensure that the alignment pin above the flange fits into the appropriate hole.

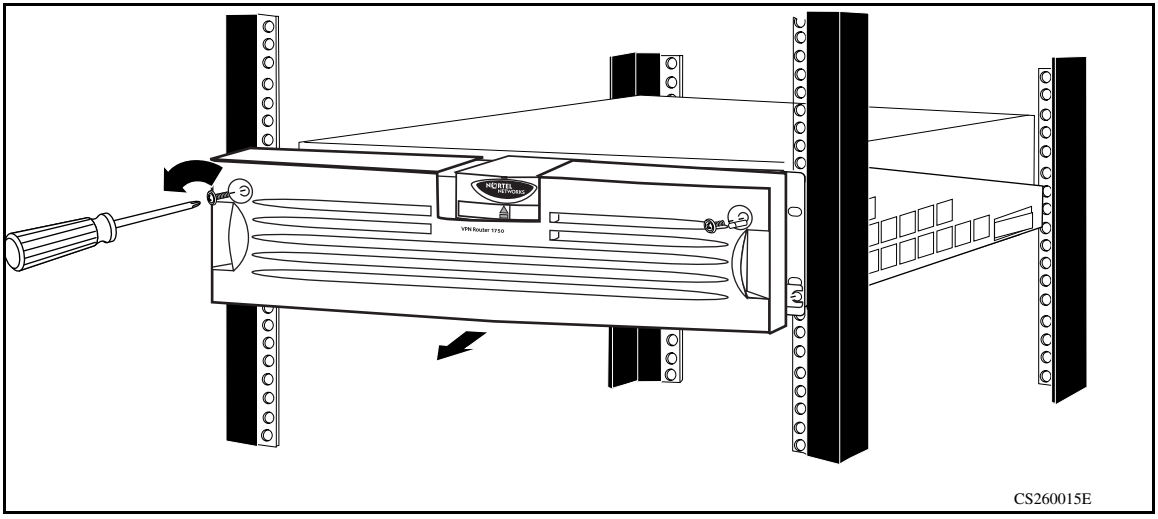
5 Insert one of the supplied panhead screws through the top hole on each side of the shelf into the hole in the rack, and tighten the screws.

Mounting the chassis in the equipment rack

Nortel recommends that two people install the chassis in the rack.

To install the VPN Router 1750 in the equipment rack, perform the following steps:

1. Set the VPN Router 1750 on the rack-mount shelf.
2. Remove the front bezel from the VPN Router 1750 as shown in the following figure.



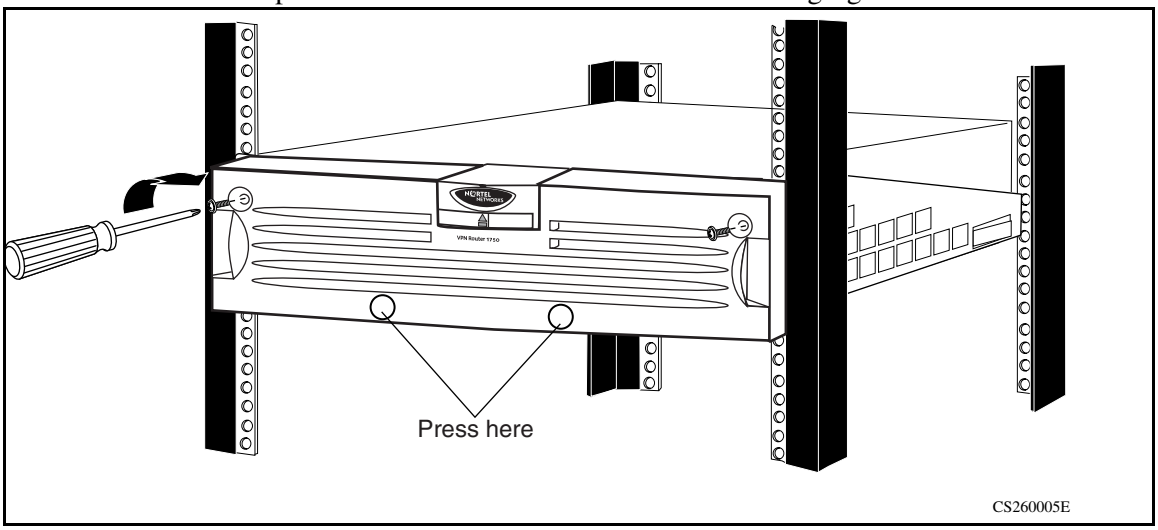
3. Use the Phillips screwdriver to turn each of the two screws on the front bezel a quarter turn counterclockwise.
4. Grip the two handles, and firmly pull the bezel toward you to unsnap it from the chassis.

Caution: Risk of equipment damage
Do not use the piece with the Nortel logo and the LEDs as a handle.

The first several times that you remove the front bezel, the bezel can stick because the ball studs and socket clips are new.

5. Insert one of the supplied panhead screws through the bottom hole on each side of the shelf into the hole in the rack, and tighten the screws.

6 Replace the front bezel as shown in the following figure.



7 Hold the two handles on the bezel, and push it onto the chassis.

8 Use the Phillips screwdriver to tighten the two screws that secure the bezel to the chassis.

Chapter 3
Option card and DIMM installation

This chapter provides instructions about how to install and replace the following field replaceable units (FRU) in the VPN Router 1750:

- Local Area Network (LAN), Wide Area Network (WAN), and serial interface cards
- Secure Sockets Layer (SSL) VPN Module 1000
- VPN Accelerator cards (VPN Router Security Accelerator [CSA] card and Hardware Accelerator card)
- dual inline memory modules (DIMM)

This chapter contains the following topics:

- "Shutting down the system to add or replace hardware" on page 48
- "Removing the front bezel and top cover" on page 49
- "Attaching the antistatic wrist strap" on page 52
- "Option card installation and replacement" on page 53
- "Installing and replacing DIMMs" on page 57

Shutting down the system to add or replace hardware

To install or replace an option card or a DIMM, you must first shut down the VPN Router 1750 and unplug it.

Warning: Risk of electric shock
Before you attempt to add or replace an option card or DIMM, shut down the VPN Router 1750 as described in this section.

To shut down the VPN Router 1750, perform the following steps:

1. Use the Web graphical user interface (GUI) or the command line interface (CLI) to shut down the gateway.
   - Web GUI: Choose **Admin**, **Shutdown**. Select the option to turn off the gateway after shutdown.

     OR
   - CLI: Use the **`reload`** command to shut down the system. For example, enter **`reload power-off disable-logins "Upgrade hardware"`**

     For more information about the **`reload`** command, see *Nortel VPN Router Using the Command Line Interface* (NN46110-507).
2. Wait for the system to shut down.
3. Disconnect the power cord from the power outlet, and then disconnect the power cord from the VPN Router 1750.

   The power receptacle is on the rear of the VPN Router 1750 (see "Rear view of the Nortel VPN Router 1750" on page 23).

Warning: Risk of electric shock
Make sure to turn off the VPN Router 1750 and unplug the power cord before you attempt to remove or install an option card or DIMM.

Removing the front bezel and top cover

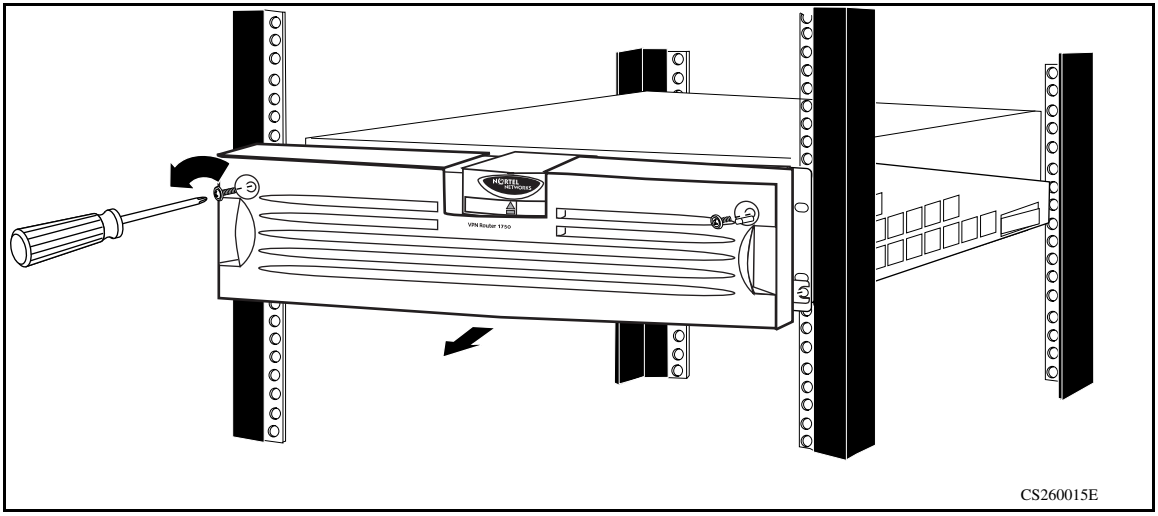
To install option cards or DIMMs, you must remove the front bezel and the top cover from the gateway.

To remove the front bezel, perform the following steps:

1 Shut down the VPN Router 1750 using the Web GUI or the CLI, and then unplug it as described in "Shutting down the system to add or replace hardware" on page 48.

Warning: Risk of electric shock
Make sure to turn off the VPN Router 1750 and unplug it before you attempt to install an option card or DIMM.

2 Use a Phillips screwdriver to turn each of the two screws on the front bezel a quarter turn counterclockwise as shown in the following figure.



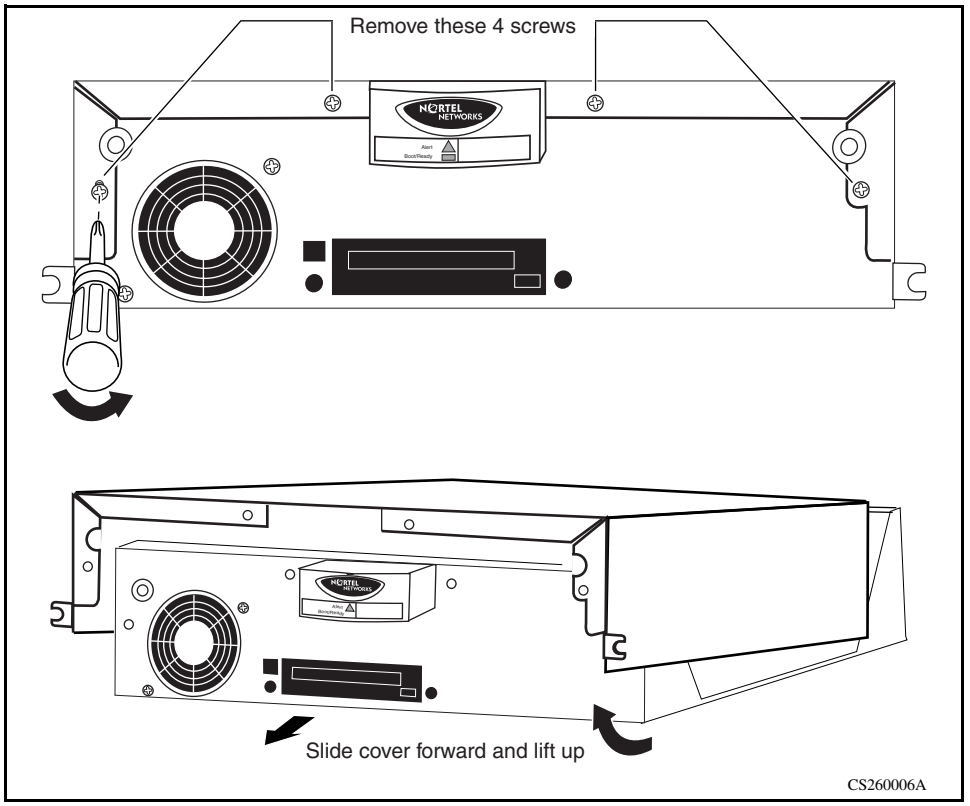
3 Grip the two handles, and firmly pull the bezel toward you to unsnap it from the chassis.

Caution: Risk of equipment damage
Do not use the piece with the Nortel logo and the LEDs as a handle.

The first several times that you remove the front bezel, the bezel can stick because the ball studs and socket clips are new.

To remove the top cover, perform the following steps:

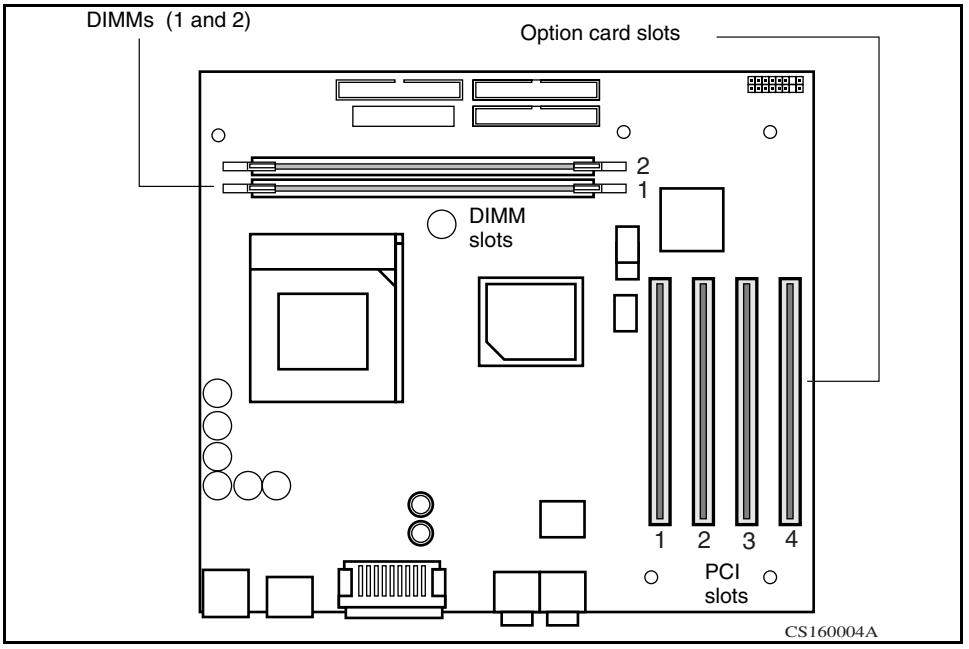
1. Remove the router from the rack if it is mounted in an equipment rack.
2. At the front of the chassis, remove the two panhead screws that secure the bottom of the chassis to the equipment rack.
3. Remove the VPN Router 1750 from the rack-mount shelf, and then set the router on a sturdy surface.
4. Use a Phillips screwdriver to remove the four screws that secure the cover to the chassis as shown in the following figure.



5. Slide the top cover forward approximately 1/4 inch.

6 Lift the lid 2 or 3 inches, and then pull it off the chassis.

The VPN Router 1750 system board is now exposed. The following figure shows the location of the option card and DIMM slots on the system board.



Warning: Risk of injury
Beware of danger if you incorrectly replace the battery. Replace the battery with the same type or an equivalent battery only as recommended by the instructions from the manufacturer. In spite of this warning, which is mandated for regulatory approval, you must not change the battery. If you suspect that the battery is dead, contact Global Nortel Technical Support (GNTS).

Attaching the antistatic wrist strap

Nortel ships the VPN Router 1750 with an antistatic wrist strap, which directs the discharge of static electricity from your body to the chassis of the gateway to avoid damage to sensitive electronic components.

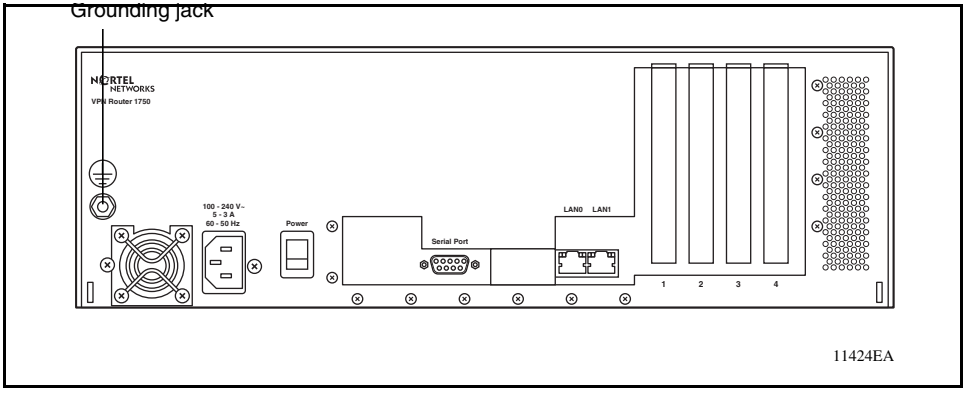
You must wear an antistatic wrist strap on your arm when you remove, install, or handle option cards and DIMMs.

Caution: Risk of equipment damage
Electrostatic discharge can damage hardware. Perform the procedure in this section to protect your equipment from damage.

To attach the antistatic wrist strap, perform the following steps:

1. Locate the antistatic wrist strap, and then verify that the cable is attached to it.
2. Place the strap around your wrist, and then adjust the strap to ensure that the metal buckle inside the strap touches your skin.
3. Insert the banana plug into the grounding jack at the rear of the chassis as shown in the following figure.

Figure 16 Location of the grounding jack for the antistatic wrist strap



Option card installation and replacement

The VPN Router 1750 provides four slots for option cards. This section provides instructions about how you can add new option cards to the VPN Router 1750 or, if necessary, replace an existing card.

The following table lists the option cards that you can install in the VPN Router 1750.

Table 16 Supported option cards for the Nortel VPN Router 1750

Option card	Maximum number	Restrictions
SSL VPN Module 1000	1	Install this card in slot 1 only. The VPN Router 1750 must run Version 5.0 or later.
VPN Router 1750 Security Accelerator Hardware Accelerator	1	Install one VPN Router 1750 Security Accelerator card or one Hardware Accelerator card. Do not install a Hardware Accelerator card in slot 4. The VPN Router 1750 must run Version 4.90 or later.
10/100BASE-TX Ethernet interface	4	—
1000BASE-T (1000 GT) Ethernet interface	4	The VPN Router 1750 must run Version 5.05.330, 6.05.140 and later, 7.00.062, 7.05.100 and later, or 7.05.300 and later.
1000BASE-T (1000 MT) interface (copper) 1000BASE-SX interface (fiber)	2	Install two 1000BASE-T (1000 MT) cards, two 1000BASE-SX cards, or one card of each type. For more information, see “Installing the SSL VPN Module 1000 with other option cards” on page 54. The VPN Router 1750 must run Version 4.90 or later.
56/64K channel service unit/digital service unit (CSU/DSU) WAN interface	4	The VPN Router 1750 must run Version 5.0 or later.
ADSL WAN interface	4	The VPN Router 1750 must run Version 4.90 or later.
Integrated Services Digital Network (ISDN) BRI S/T or U interface	4	The VPN Router 1750 must run Version 4.80 or later.
T1CSU/DSU WAN interface (full-height)	4	For E1 support, you must install the half-height interface card.
T1/E1 CSU/DSU WAN interface (half-height)	4	
Quad T1/E1 CSU/DSU WAN interface	3	The VPN Router 1750 must run Version 4.90 or later.

Table 16 Supported option cards for the Nortel VPN Router 1750

Option card	Maximum number	Restrictions
V.90 modem interface	4	If you install an SSL VPN Module 1000 in slot 1, do not install the V.90 modem interface card in slot 2. The VPN Router 1750 must run Version 4.80 or later.
Single V.35/X.21 WAN interface (full-height)	4	—
Single V.35/X.21 WAN interface (half-height)	4	The VPN Router 1750 must run Version 4.80 or later.
HSSI WAN interface	2	Do not install in slot 4; install in slot 3 or 1 if possible. If you install an SSL VPN Module 1000, you can install only one HSSI WAN interface card.The gateway must run Version 4.76 or later, or the hardware revision must be at least 03.

Installing the SSL VPN Module 1000 with other option cards

If you install an SSL VPN Module 1000 in the VPN Router 1750, the following restrictions on other option cards apply:

- You cannot install a V.90 modem interface card in slot 2.
- You can install only one HSSI WAN interface card. Do not install this card in slot 4; if possible, install it in slot 3.
- You can install two 1000BASE-T/1000BASE-SX interface cards only if you do not install one of the following option cards:
  - VPN Router Security Accelerator
  - Hardware Accelerator
  - HSSI WAN interface

  If you install a VPN Router Security Accelerator, Hardware Accelerator, or HSSI WAN interface card, you can install only one 1000BASE-T or 1000BASE-SX interface card.

Installing and replacing an option card

Before you install or replace an interface card or Hardware Accelerator card, complete the following procedures:

- Shut down the VPN Router 1750 by using the Web GUI or the CLI, and then unplug it as described in "Shutting down the system to add or replace hardware" on page 48.

Warning: Risk of electric shock
Turn off the VPN Router 1750 and unplug it before you attempt to install an option card.

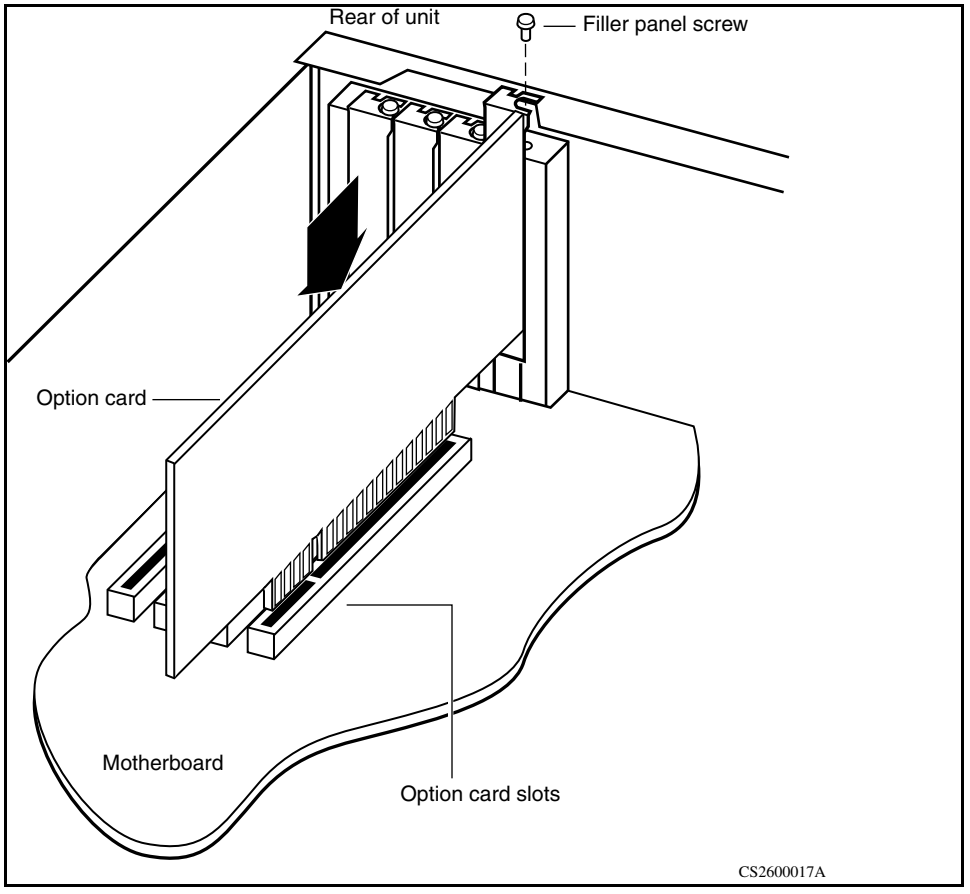
- Remove the front bezel from the chassis, and then remove the chassis from the equipment rack. For more information, see "Removing the front bezel and top cover" on page 49.
- Remove the top cover from the chassis. For more information, see "Removing the front bezel and top cover" on page 49.
- Attach the antistatic wrist strap that ships with the VPN Router 1750. For more information, see "Attaching the antistatic wrist strap" on page 52.

To install or replace an interface card or a Hardware Accelerator card:

1 Locate the slot where you plan to install the new or replacement option card.

Note: Do not try to install an HSSI WAN interface card or a Hardware Accelerator card in slot 4.

2 Remove the filler panel screw, and pull out the filler panel (or the option card to replace) from the slot as shown in the following figure.



3 Lower the new option card into the slot, and then gently press the connector into the slot.

Seat the card in the slot. If you do not properly seat the card, it does not work.

4 Replace the screw that secures the card to the slot.

5 Replace the top cover on the chassis.

6 Hold the cover at an angle, and then slide it onto the chassis.

7 Use a screwdriver to insert and tighten the four screws that secure the cover to the chassis.

8 If you want to install the VPN Router 1750 in an equipment rack, mount it in the rack.

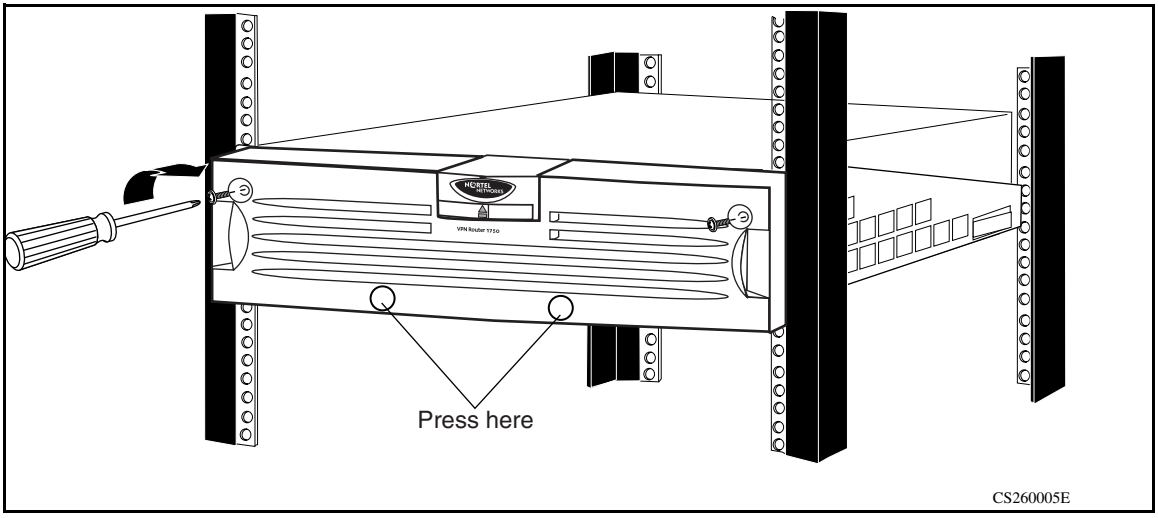
9 Set the VPN Router 1750 on the rack-mount shelf in the rack.

10 Insert one of the panhead screws through the bottom hole on each side of the shelf into the hole in the rack, and tighten the screws.

11 Replace the front bezel.

12 Hold the bezel by the two handles, and push it onto the chassis.

13 Use a screwdriver to tighten the two screws that secure the bezel to the chassis; see the following figure.



Installing and replacing DIMMs

The VPN Router 1750 has two slots for DIMMs. Unless you order additional memory, Nortel ships the VPN Router 1750 with one 128 Megabit (MB) DIMM installed. You can install a second 128 MB DIMM to upgrade memory in the gateway.

Caution: If you use a memory module not purchased from Nortel, you can render your warranty or your service contract void.

Caution: Install the same type of DIMM that is installed in your gateway. For example, do not install a 256 MB DIMM in the VPN Router 1750.

Before you install or replace a DIMM, complete the following procedures:

- Shut down the VPN Router 1750 by using the Web GUI or the CLI, and then unplug it as described in "Shutting down the system to add or replace hardware" on page 48.

Warning: Risk of electric shock
Turn off the VPN Router 1750 and unplug it before you attempt to install a DIMM.

- Remove the front bezel from the chassis, and then remove the chassis from the equipment rack. For more information, see "Removing the front bezel and top cover" on page 49.
- Remove the top cover from the chassis. For more information, see "Removing the front bezel and top cover" on page 49.
- Attach the antistatic wrist strap that ships with the VPN Router 1750. For more information, see "Attaching the antistatic wrist strap" on page 52.

Caution: Risk of equipment damage
Electrostatic discharge can damage VPN Router 1750 components.

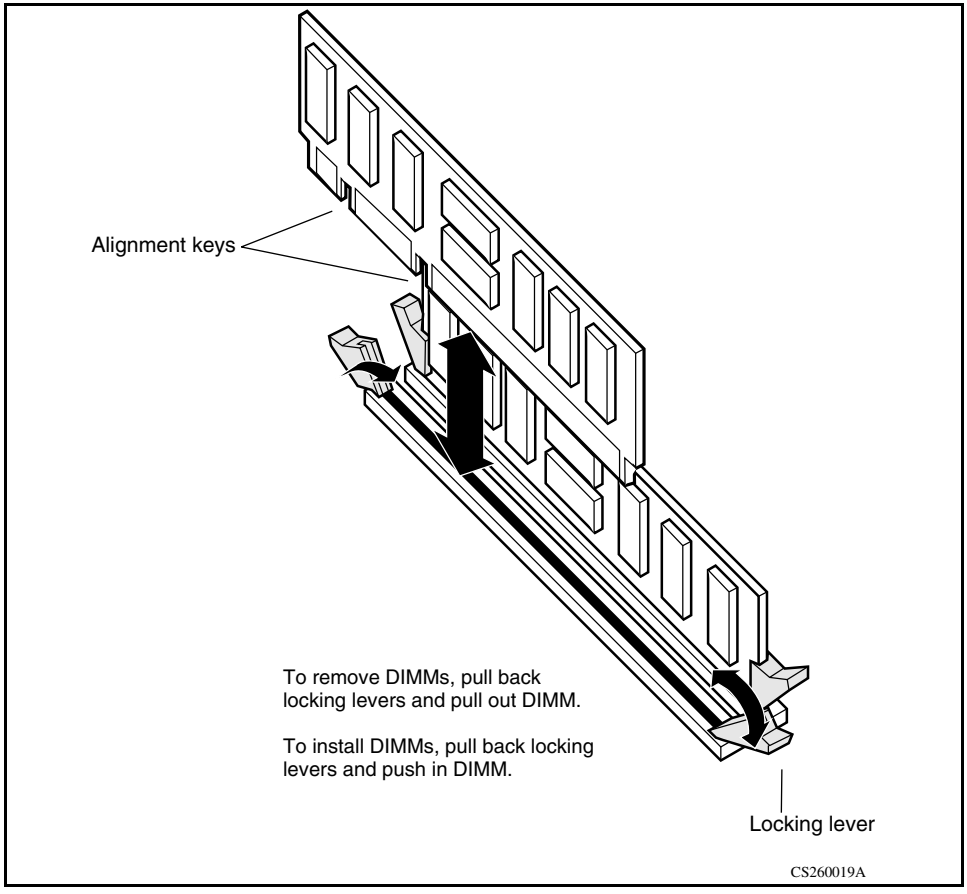
To install or replace a DIMM, perform the following steps:

1. If you need to replace a DIMM, remove the installed DIMM as follows:
   a. Press down the locking lever on either side of the DIMM.
   b. Pull the DIMM up to remove it from the slot.
2. Press down the locking lever on either side of the slot where you plan to install the new DIMM.
3. Place the new or replacement DIMM in the slot.

   Use the alignment keys to properly position the DIMM in the slot.

4 Press the DIMM firmly into the socket.

5 Pull up the locking lever on either side of the DIMM to snap it into position; see the following figure.


Alignment keys
To remove DIMMs, pull back locking levers and pull out DIMM.
To install DIMMs, pull back locking levers and push in DIMM.
Locking lever
CS260019A

6. Replace the top cover on the chassis.
7. Hold the cover at an angle, and slide it onto the chassis.
8. Insert the four screws that secure the cover to the chassis, and use a screwdriver to tighten the screws.
9. If you want to install the VPN Router 1750 in an equipment rack, mount it in the rack.
10. Set the VPN Router 1750 on the rack-mount shelf in the rack.
11. Insert one of the panhead screws through the bottom hole on each side of the shelf into the hole in the rack, and tighten the screws.
12. Replace the front bezel.
13. Hold the bezel by the two handles, and push it onto the chassis.
14. Use the screwdriver to tighten the two screws that secure the bezel to the chassis.

Chapter 4
Management IP interface configuration

This chapter describes how to configure a management Internet Protocol (IP) address, subnet mask, and default gateway address on a newly installed VPN Router 1750. After you complete the procedures in this chapter, you can configure and manage the VPN Router 1750 by using a Web browser from a PC.

To configure the management IP interface, you can use the serial interface configuration menu. You must connect a PC or terminal to the serial port on the VPN Router 1750.

This chapter contains the following topics:

- "Required information" on page 62
- "Configuring the management IP address" on page 63
- "Testing the configuration" on page 67
- "Troubleshooting" on page 68

Required information

Before you configure the management interface, collect the following information:

- IP address for the management interface

  The management IP address must be accessible from one of the private physical interfaces on the VPN Router 1750. For example, if you plan to assign IP address 10.2.3.3 with subnet mask 255.255.0.0 to the private physical interface, the management IP address must reside in the 10.2 network.

- subnet mask

  The subnet mask specifies which IP addresses are directly reachable on the network and which ones must be routed through a gateway. For example, the IP address 10.2.3.3 with a subnet mask of 255.255.0.0 indicates that all hosts with addresses 10.2.n.n are directly reachable.

- default gateway (optional)

  The default gateway routes packets to destinations for which no specific route exists in the routing table. You can configure a default gateway when you assign the management IP address, or you can configure it at a later time.

Note: Write down and save the management IP address. You need the IP address to configure the VPN Router 1750.

Configuring the management IP address

Use the serial interface to assign the VPN Router 1750 a management IP address and subnet mask so that you can then use a Web browser for management.

To configure the management IP address using the serial interface, perform the following steps:

1. Turn on the terminal or PC.
2. Configure the terminal or PC with the following specifications:
   - 9600 baud
   - eight data bits
   - one stop bit
   - no parity
   - no flow control
3. Connect the serial cable (supplied with the VPN Router 1750) from the serial port on the gateway to a terminal or to the communications port on a PC.
4. On the PC, start HyperTerminal or another terminal emulation program, and press **Enter**.

   The Nortel VPN Router window appears with the following message:

   ```
   Nortel VPN Router
   Copyright (c) 1999-2005 Nortel Networks, Inc.

   Version:              V07_0.024
   Creation date:        Jul 6 2006, 08:23:16
   Unit Serial Number:   510649

   Please enter the administrator's user name:
   ```

5. Enter the default user name and password for the administrator.

   The factory default user name is admin, and the default password is setup. The user name and password are case sensitive; see the following example.

   ```
   Please enter the administrator's user name: admin

   Please enter the administrator's password: *****
   ```

The serial main menu appears with the following message.

```
Main Menu: System is currently in NORMAL mode.

   0) Management Address
   1) Interfaces
   2) Administrator
   3) Default Private Route Menu
   4) Default Public Route Menu
   5) Create A User Control Tunnel (IPsec) Profile
   6) Restricted Management Mode          FALSE
   7) Allow HTTP Management               TRUE
   8) Firewall Options
   9) Shutdown
   B) System Boot Options
   P) Configure Serial Port
   C) Controlled Crash
   L) Command Line Interface
   R) Reset System to Factory Defaults
   E) Exit, Save and Invoke Changes

Please select a menu choice (0 - 9,B,P,C,L,R,E):
```

6 To configure the Interface IP address from the serial menu, type **1**, and then press **Enter**.

The interface menu appears with the following message.

```
- Interface Menu

0) Slot 0, Port 2, Public LAN
     IP Address =
     Subnet Mask = 0.0.0.0
     Speed/Duplex = AutoNegotiate

1) Slot 0, Port 1, Private LAN
     IP Address =192.167.120.14
     Subnet Mask = 255.255.255.0
     Speed/Duplex = AutoNegotiate

R) Return to the Main Menu.

Please select a menu choice:
```

7 Type **0**, and then press **Enter** to configure the IP address.

The IP address prompt appears:

```
0) Slot 0, Port 2, Public LAN
     IP Address =
     Subnet Mask = 0.0.0.0
     Speed/Duplex = AutoNegotiate

*Type 0.0.0.0 to delete.
*Just type <CR> to skip.
   Old IP address =
   New IP address =
```

8 Type a new IP address, and then press **Enter**.

The subnet mask prompt appears:

```
Old Subnet Mask = 0.0.0.0

New Subnet Mask =
```

9 At the New Subnet Mask prompt, type the subnet mask for the management IP address, and then press **Enter**.

The Speed/Duplex prompt appears.

10 Press **Enter** to leave the speed and duplex settings unchanged.

The Interface menu appears again with the changes you make:

```
0) Slot 0, Port 2, Public LAN
     IP Address =
     Subnet Mask = 0.0.0.0
     Speed/Duplex = AutoNegotiate

1) Slot 0, Port 1, Private LAN
     IP Address =192.167.120.14
     Subnet Mask = 255.255.255.0
     Speed/Duplex = AutoNegotiate

R) Return to the Main Menu.

Please select a menu choice:
```

11 Type **R**, and then press **Enter** to return to the serial main menu.

12 To configure the management IP address, type **0**, and then press **Enter**.

The Management IP Address menu appears:

```
- Management IP Address Menu

M) Management IP Address =
R) Return to the Main Menu

Please select a menu choice (M,R):
```

13 Type **M**, and then press **Enter**.

The Management IP Address prompt appears:

```
*Type 0.0.0.0 to delete.
*Just type <CR> to skip.
   Old management IP address =
   New management IP address =
```

14 Type the new management IP address, and then press **Enter** to configure the management IP address.

The new IP management address appears in the Management IP Address menu:

```
- Management IP address menu

M) Management IP Address =192.167.120.13
R) Return to the Main Menu

Please select a menu choice (M,R):
```

15 Type **R**, and then press **Enter** to return to the serial main menu.

The serial main menu appears.

16 From the serial main menu, type **E**, and then press **Enter** to save the new management IP address and mask, and to exit the serial menu.

For more information about how to configure and manage the VPN Router 1750, see the documentation on the VPN Router software CD.

Testing the configuration

After you assign a management IP address to the VPN Router 1750, start a Web browser to verify that you can access the gateway from a browser.

To manage the VPN Router 1750 by using the GUI, your PC must run one of the following browsers:

- Internet Explorer Version 6.0 or later
- Netscape Navigator 4.79 or 6.2
- Firefox 2.0 or later

To test the management IP address on the VPN Router 1750, perform the following steps:

1. Open a Web browser.
2. In the URL field, enter **http://** followed by the management IP address that you assigned to the VPN Router 1750.

   For example, if the management IP address is 47.17.248.52, enter **http://47.17.248.52**.

   If the Welcome window appears, you correctly configured the management IP address for the VPN Router 1750.

Note: If the Welcome window does not appear, see "Troubleshooting" on page 68.

For more information about how to configure the router, see *Nortel VPN Router Configuration — Basic Features* (NN46110-500).

Troubleshooting

If you cannot connect to the VPN Router 1750 by using your browser, check the following items:

- Ensure that you entered the correct IP address in the browser window.
- Type a known URL in the browser window to ensure that your network connection is good.
- Check that the management IP address is on the same subnet as the physical Local Area Network (LAN) attached to the gateway.
- Ensure that your PC runs a supported browser, either Internet Explorer Version 5.5 or later, or Netscape Navigator 4.79 or 6.2.
- Check the physical connections on the VPN Router 1750, especially the LAN cables and the power cord.

If you still cannot connect to the VPN Router 1750 by using a browser, connect a terminal or PC to the gateway with the serial cable and check the management IP address listed in the serial menu. For more information, see "Configuring the management IP address" on page 63. Reconfigure the management IP address if necessary.

If you cannot resolve the problem, contact the Nortel Technical Solutions Center closest to you.

Appendix A
Technical specifications

This appendix provides technical specifications for the VPN Router 1750 chassis and the chassis interfaces.

Chassis specifications

The following table lists physical, electrical, and environmental specifications for the chassis.

Table 17 Physical, electrical, and environmental specifications

Specification	Description
Physical	
Height	5.25 in. (13.335 cm)
Width	17 in. (43.18 cm)
Depth	21 in. (53.34 cm)
Weight	28 lbs. (12.7 kg)
Electrical	
Voltage	100–240 VAC
Current	5 A @ 100 VAC or 3 A @ 240 VAC
Frequency	50–60 Hz
Environmental	
Operating temperature	32–104°F (0–40°C)
Storage temperature	-40–185°F (-40–85°C)
Operating humidity	10–90% noncondensing
Storage humidity	10–95% noncondensing

Table 17 Physical, electrical, and environmental specifications (continued)

Specification	Description
Operating altitude	8202 ft (2500 m) maximum
Storage altitude	40 000 ft (12 192 m) maximum

System ports

This section provides information about the 10/100BASE-TX Ethernet LAN ports and the serial port on the system board.

The VPN Router 1750 system board provides the following built-in interfaces:

- two 10/100BASE-TX Ethernet local area network (LAN) ports
- one serial port

10/100BASE-TX Ethernet LAN ports

The system board provides two 10/100BASE-TX Ethernet LAN interfaces—LAN 0 and LAN 1—on the rear of the chassis. (The LAN 0 interface provides Web management.) Both built-in LAN interfaces accommodate an RJ-45 straight-through cable. Depending on whether you use the interfaces for 10BASE-T or 100BASE-TX operation, select cables for the interfaces as follows:

- 100BASE-TX connections require category 5 twisted-pair wire. The 100BASE-TX specification supports 100 Mb/s transmission over two pairs of category 5 twisted-pair Ethernet wiring: one pair each for transmit and receive operations.

  Nortel recommends that you use a maximum length of 100 meters for the cable segment between a 100BASE-TX repeater and a workstation (due to signal timing requirements). This wiring scheme complies with the EIA 568 wiring standard.

- 10BASE-T connections can use category 3, 4, or 5 twisted-pair wiring.

"10/100BASE-TX Ethernet connector" on page 71 shows the 10/100BASE-TX connector and the connector pinouts.

Figure 17 10/100BASE-TX Ethernet connector

The following table provides the 10/100BASE-TX Ethernet port pinouts.

Table 18 10/100BASE-TX Ethernet port pinouts

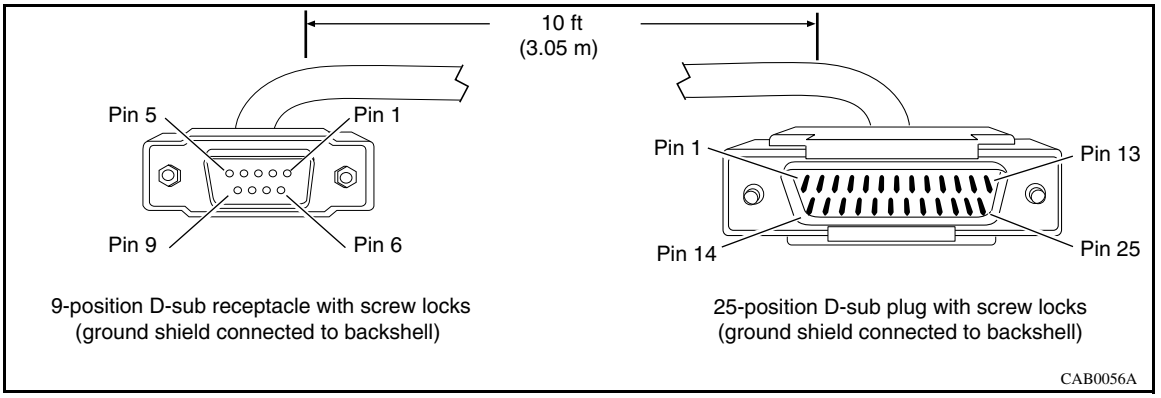
Pin	Description
1	TD +
2	TD -
3	RD +
6	RD -

Serial port

The system board provides a serial port on the rear of the chassis to enable out-of-band management. Use the serial port to assign the management IP address and subnet mask to the newly installed gateway. For more information, see Chapter 4, “Management IP interface configuration,” on page 61.

The serial cable is a DB9/DB25-to-DB9/DB25 cable. This cable provides a crossover connection (transmit-to-receive and receive-to-transmit). The DB9 connector connects to the gateway, and the other DB9 or DB25 connector connects to the workstation. “Modem cable (9-pin D-sub plug to RS-232-C modem plug)” on page 72 shows the serial cable ends.

Figure 18 Modem cable (9-pin D-sub plug to RS-232-C modem plug)



The following table provides the multiple DB9 and DB25 serial interface cable pinouts.

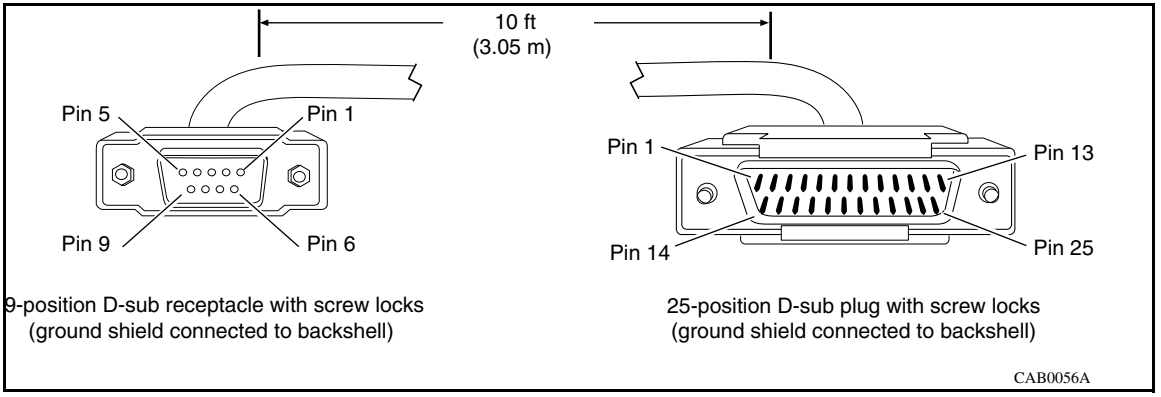
Table 19 Multiple DB9 and DB25 connector pinouts

Serial port DB9 connector		**Serial port DB25 connector**			**Serial port DB25 connector**		**Serial port DB9 connector**	
Pinout	Signal	Pinout	Signal		Pinout	Signal	Pinout	Signal
2	RXD	3	TXD	>	2	RXD	3	TXD
3	TXD	2	RXD	>	3	TXD	2	RXD
4	DTR	20	DSR	>	6	DTR	6	DSR
5	Ground	7	Ground	>	7	Ground	5	Ground
6	DSR	6	DTR	>	20	DSR	4	DTR
7	RTS	4	RTS	>	5	CTS	8	CTS
8	CTS	5	CTS	>	4	RTS	7	RTS

Modem cable specifications

If you need to connect a modem to a VPN Router 1750, you must obtain an appropriate modem cable. The modem cable must have a 9-pin D-sub plug that connects to the VPN Router 1750 serial port and a 25-pin D-sub plug that connects to the RS-232-C modem port. “Modem cable (9-pin D-sub plug to RS-232-C modem plug)” on page 73 shows the cable ends.

Figure 19 Modem cable (9-pin D-sub plug to RS-232-C modem plug)



The following table provides the modem cable pinouts.

Table 20 Modem cable pinouts

Nortel termination		**Modem termination**	
Signal	**Pin # to Pin #**		**Signal**
Data Carrier Detect	1	8	Data Carrier Detect
Transmit Data (TXD)	2	2	Transmit Data (TXD)
Receive Data (RXD)	3	3	Receive Data (RXD)
Data Set Ready	4	6	Data Set Ready
Data Terminal Ready	6	20	Data Terminal Ready
Clear to Send	7	5	Clear to Send
Request to Send	8	4	Request to Send

Hardware option cards

This section provides information about the option cards, including the connector and the cable pinouts for each supported network interface card.

The VPN Router 1750 provides four peripheral component interconnect (PCI) slots that support a combination of the following option cards:

- VPN Router Security Accelerator and Hardware Accelerator cards

- Secure Sockets Layer (SSL) VPN Module 1000
- 10/100BASE-TX Ethernet interface card
- 1000BASE-T (1000 GT) Ethernet interface card
- 1000BASE-T (1000 MT) Ethernet interface card
- 1000BASE-SX Ethernet interface card
- 56/64K Digital Service Unit/Channel Service Unit (CSU/DSU) WAN interface card
- Asymmetric Digital Subscriber Line (ADSL) WAN interface card
- Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) interface card
- T1 CSU/DSU WAN interface card (full-height card)
- T1/E1 CSU/DSU WAN interface card (half-height card)
- Quad T1/E1 CSU/DSU WAN interface card
- V.90 modem interface card
- Single V.35/X.21 WAN interface card
- High Speed Serial Interface (HSSI) WAN interface card

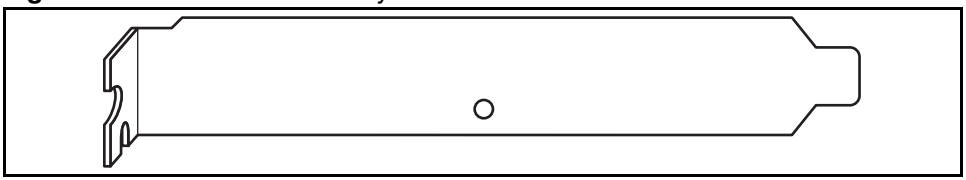
VPN Router Security Accelerator card

Nortel supports the VPN Router Security Accelerator option card that performs bulk encryption and compression algorithms for IPsec tunnel traffic.

The VPN Router Security Accelerator card uses a single Hifn 7854 chip for encryption and compression and has 64 MB of onboard RAM. The card supports Advanced Encryption Standard (AES)-128 cryptography with SHA-1 authentication and Triple Data Encryption Standard (3DES) cryptography with either Message Digest 5 Algorithm (MD5) or Secure Hash Algorithm (SHA)-1 authentication.

"VPN Router Security Accelerator card" on page 75 shows the VPN Router Security Accelerator card.

Figure 20 VPN Router Security Accelerator card



The VPN Router Security Accelerator card is the successor to the Hardware Accelerator card. Even though Nortel discontinued the Hardware Accelerator Hifn 7811 card effective January 2006, Nortel still supports this card. The VPN Router Security Accelerator card provides increased encryption throughput and improved compression performance.

Note: The VPN Router Security Accelerator card has one green Light Emitting Diode (LED); the Hardware Accelerator card has no LEDs.

At startup, after you manually enable an accelerator card, or after the accelerator recovers from a failure, the power-on self-test (POST) verifies the integrity of the hardware. This test includes validation of the encryption, media access control (MAC), and compression algorithms against their software counterparts. In the event POST fails, the accelerator card is set offline.

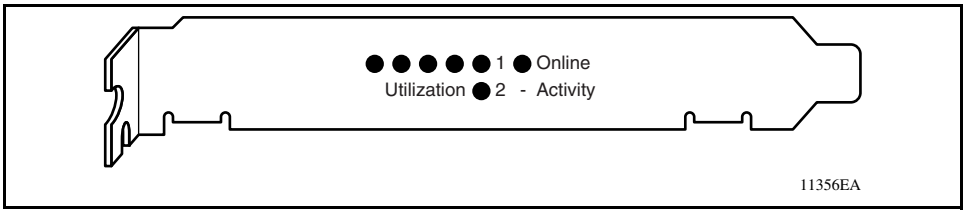
For more information about the VPN Router Security Accelerator card and the Hardware Accelerator card, and instructions to configure these cards, see *Nortel VPN Router Configuration — Advanced Features* (NN46110-502).

SSL VPN Module 1000

The SSL VPN Module 1000 provides complete SSL VPN processing capability to the VPN Router gateway. This module provides a unified solution for IPsec and remote access SSL VPN.

"SSL VPN Module 1000" on page 76 shows the SSL VPN Module 1000.

Figure 21 SSL VPN Module 1000



The SSL VPN Module 1000 has no external access: all traffic to and from the SSL VPN Module 1000 card occurs over an internal high-speed link.

The VPN Router 5000, 2700, and 1750 gateways running VPN Router Version 5.0 software support the SSL VPN Module 1000. You must install the SSL VPN Module 1000 in slot 1 of the VPN Router 5000, 2700, or 1750.

The VPN Router gateway distinguishes between the services that it provides, and the services that the SSL VPN Module 1000 provides and immediately forwards the appropriate traffic to the SSL VPN module.

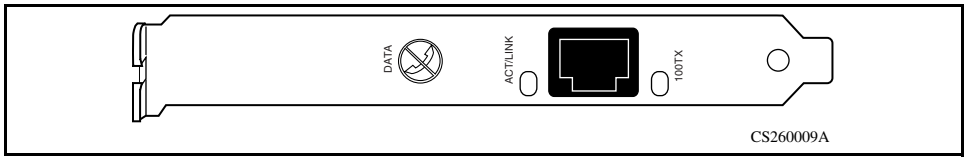
Note: For more information about the SSL VPN Module 1000 and instructions to configure it, see *Nortel VPN Router Configuration — SSL VPN Services* (NN46110-501).

10/100BASE-TX Ethernet interface card

The 10/100BASE-TX Ethernet interface card has a single RJ-45 connector that provides the signals needed to interface to 10BASE-T and 100BASE-TX Ethernet equipment.

The following figure shows the 10/100BASE-TX Ethernet interface card.

Figure 22 10/100BASE-TX Ethernet interface card



For information about the cables that you can connect to this interface and the cable pinouts, see "10/100BASE-TX Ethernet LAN ports" on page 70.

1000BASE-T (1000 GT) Ethernet interface card

The 1000BASE-T (1000 GT) Ethernet card replaces the 10/100BASE-TX Ethernet card (see the preceding section). This card provides 10/100/1000 Mb/s Ethernet services and supports autonegotiation. The card supports the IEEE 802.3ab standard and provides RJ-45/CAT 5 interconnection; it can operate in either full- or half-duplex mode at 10/100 Mb/s, and in full-duplex mode at 1 Gb/s. At 1 Gb/s, autonegotiation must be used.

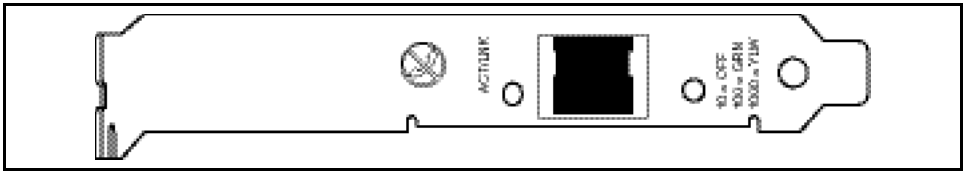
For the 1000BASE-T (1000 GT) Ethernet interface card to be recognized by the system, the minimum required VPN Router operating software is:

- 5.05.330
- 6.05.140 and all subsequent versions
- 7.00.062
- 7.05.100 and all subsequent versions (FIPS branch)
- 7.05.300 and all subsequent versions

The 1000 GT card does not replace the high-performance 1000BASE-T 1000 MT card (see the following section).

The following figure shows the 1000BASE-T (1000 GT) Ethernet interface full-height card for VPN Router 1750.

Figure 23 1000BASE-T (1000 GT) Ethernet interface card

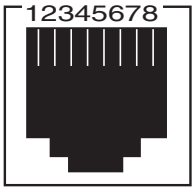


Select cables for the card as follows, keeping in mind that this card is autonegotiating and uses the highest possible data rate:

- For 1000BASE-T operation, use category 5 four-pair Ethernet wiring. The cable must comply with the TIA 568 wiring specification. Nortel recommends a maximum length of 100 meters for the cable segment.
- For 100BASE-TX operation, use category 5 twisted-pair wiring: one pair each for transmit and receive operations. The cable must comply with the EIA 568 wiring specification. Nortel recommends a maximum length of 100 meters for the cable segment.
- For 10BASE-T operation, use category 3, 4, or 5 twisted-pair wiring.

The following table provides the pinouts for the 1000BASE-T (1000 GT) Ethernet interface card.

Table 21 1000BASE-T (1000 GT) Ethernet pinouts



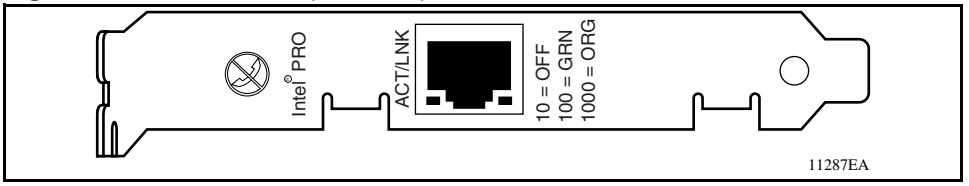
Pin	Description
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-
7	TP3+
8	TP3-

1000BASE-T (1000 MT) Ethernet interface card

Use the 1000BASE-T (1000 MT) Ethernet interface card to connect to Gigabit Ethernet interfaces on other devices in your network, as well as to provide increased throughput. This interface card has a single RJ-45 connector.

The following figure shows the 1000BASE-T (1000 MT) Ethernet interface card.

Figure 24 1000BASE-T (1000 MT) Ethernet interface card

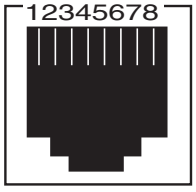


The port on the 1000BASE-T Ethernet interface card accommodates an RJ-45 straight-through cable. Select cables for this port as follows:

- For 1000BASE-T operation, use category 5 four-pair Ethernet wiring. The cable must comply with the TIA 568 wiring specification. Nortel recommends a maximum length of 100 meters for the cable segment.
- For 100BASE-TX operation, use category 5 twisted-pair wiring: one pair each for transmit and receive operations. The cable must comply with the EIA 568 wiring specification. Nortel recommends a maximum length of 100 meters for the cable segment.
- For 10BASE-T operation, use category 3, 4, or 5 twisted-pair wiring.

The following table provides the 1000BASE-T (1000 MT) Ethernet port pinouts.

Table 22 1000BASE-T (1000 MT) Ethernet port pinouts



Pin	Description
1	TP0+
2	TP0-
3	TP1+
4	TP2+
5	TP2-
6	TP1-

Table 22 1000BASE-T (1000 MT) Ethernet port pinouts

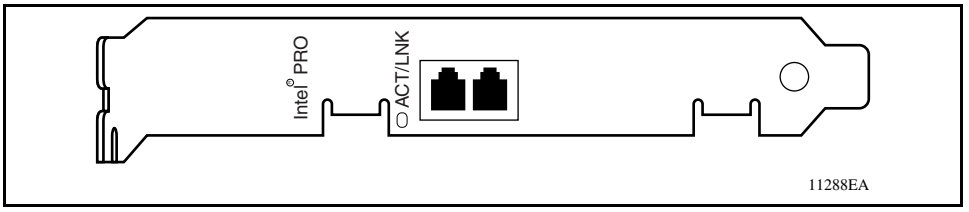
	Pin	Description
	7	TP3+
	8	TP3-

1000BASE-SX Ethernet interface card

The 1000BASE-SX Ethernet interface card implements short-wavelength (850 nm) laser transmissions. Use this interface card to connect to fiber Gigabit Ethernet interfaces on other devices in your network, as well as to provide increased throughput. The 1000BASE-SX Ethernet interface card has a single type LC fiber connector.

The following figure shows the 1000BASE-SX Ethernet interface card.

Figure 25 1000BASE-SX Ethernet interface card



The port on the 1000BASE-SX Ethernet interface card accommodates a multimode fiber (MMF) cable that meets MMF standards. Select fiber cable for this interface as follows:

- 50-micron MMF cable: provides a distance range of 500–550 meters (m)
- 62.5-micron MMF cable: provides a distance range of 220–275 m

You can order a 10-foot MMF cable from Nortel:

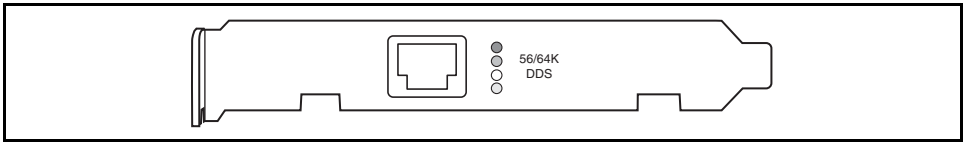
- Order no. DM0011117 provides an LC-to-LC connector
- Order no. DM0011118 provides an LC-to-SC connector

56/64K CSU/DSU WAN interface card

The 56/64K CSU/DSU WAN interface card has a single RJ-48 connector that provides the signals needed to interface to network equipment.

The following figure shows the 56/64K CSU/DSU WAN interface card.

Figure 26 56/64K CSU/DSU WAN interface card



The connector on the 56/64K CSU/DSU WAN interface card accommodates an 8-pin RJ-48 modular patch cord.

Note: Nortel does not supply an interface cable with the 56/64K CSU/DSU WAN interface card.

Use cable that is wired in accordance with ANSI T1.410 wiring style. This wiring style ensures that a twisted pair inside the patch cord carries the transmit signal (pins 1 and 2) and the receive signal (pins 7 and 8). Nortel strongly recommends that you use professionally manufactured patch cords.

Connect the 56/64K CSU/DSU WAN interface card to the service provider network by using a straight-through cable or a crossover cable, depending on how the service provider wired the jack.

The following table provides the 56/64K CSU/DSU cable pinouts for a crossover connection.

Table 23 56/64K CSU/DSU cable pinouts for crossover connection

Nortel termination		**Remote termination**	
Signal	**Pin # to Pin #**		**Signal**
Transmit tip	1	7	Receive tip
Transmit ring	2	8	Receive ring
Not used	3	3	Not used
Not used	4	4	Not used
Not used	5	5	Not used
Not used	6	6	Not used
Receive tip	7	1	Transmit tip
Receive ring	8	2	Transmit ring

The cable operates properly if you do not connect pins 3, 4, 5, and 6.

The following table provides the 56/64K CSU/DSU cable pinouts for a straight-through connection.

Table 24 56/64K CSU/DSU cable pinouts for straight-through connection

Nortel termination		**Remote termination**	
Signal	**Pin # to Pin #**		**Signal**
Transmit tip	1	1	Transmit tip
Transmit ring	2	2	Transmit ring
Not used	3	3	Not used
Not used	4	4	Not used
Not used	5	5	Not used
Not used	6	6	Not used
Receive tip	7	7	Receive tip
Receive ring	8	8	Receive ring

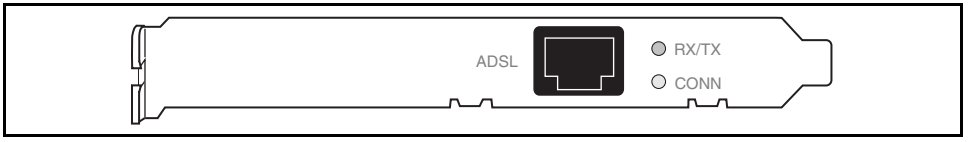
ADSL WAN interface card

The ADSL Annex A and Annex B WAN interface cards have a single RJ-11 connector that provides the signals needed to interface to the ADSL-provisioned telephone line.

"ADSL WAN interface card" on page 84 shows the ADSL WAN interface card.

Note: The ADSL Annex A and ADSL Annex B cards look identical.

Figure 27 ADSL WAN interface card



Included in the accessory box with the ADSL WAN interface card is a 7-foot cable to attach to the DSLAM:

- The Annex A cable is an RJ-11 to RJ-11 cable.
- The Annex B cable is an RJ-11 to RJ-45 cable.

The following table provides the pinouts for the ADSL Annex A cable.

Table 25 ADSL Annex A cable pinouts

Pin	Function
1	N/C
2	Tip
3	Ring
4	N/C

The following table provides the pinouts for the ADSL Annex B cable.

Table 26 ADSL Annex B cable pinouts

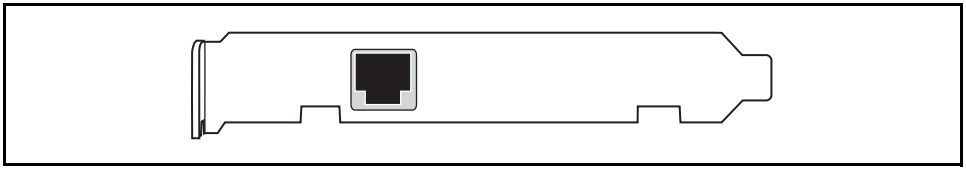
RJ-11 termination		RJ-45 termination	
Signal	**Pin # to Pin #**		**Signal**
N/C	1	6	N/C
Tip	2	5	Tip
Ring	3	4	Ring
N/C	4	3	N/C

ISDN BRI interface card

The ISDN BRI S/T and ISDN BRI U interface cards have a single RJ-45 connector that provides the signals to interface to ISDN equipment. (To connect the ISDN S/T interface to the ISDN network, you must attach an external NT-1 device to the RJ-45 connector.)

The following figure shows the ISDN BRI S/T interface card or the ISDN BRI U interface card. The two cards look identical.

Figure 28 ISDN BRI S/T interface card or ISDN BRI U interface card



The connector on the ISDN BRI S/T and ISDN BRI U interface cards accommodates an 8-pin RJ-45 modular patch cord. These cables are sold as category 5, or Ethernet, cables.

Note: Nortel does not supply a cable with the ISDN BRI interface cards.

The following table provides the ISDN BRI S/T cable pinouts.

Table 27 ISDN BRI S/T cable pinouts

Pin	Function
1	N/C
2	N/C
3	Receive +
4	Transmit +
5	Transmit -
6	Receive -
7	N/C
8	N/C

The following table provides the ISDN BRI U cable pinouts.

Table 28 ISDN BRI U cable pinouts

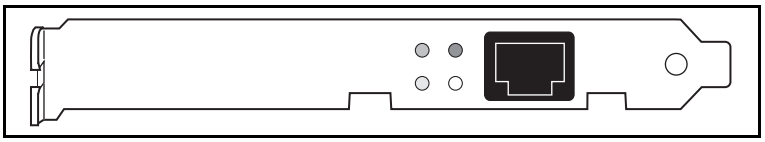
Pin	Function
1	N/C
2	N/C
3	N/C
4	U interface network connection (tip)
5	U interface network connection (ring)
6	N/C
7	N/C
8	N/C

T1/E1 CSU/DSU WAN interface card

The T1/E1 CSU/DSU WAN interface card has a single connector that provides the signals to interface to T1 or E1 equipment. This interface card ships as a half-height card and as a full-height card.

The following figure shows the T1/E1 CSU/DSU WAN interface card (half-height card).

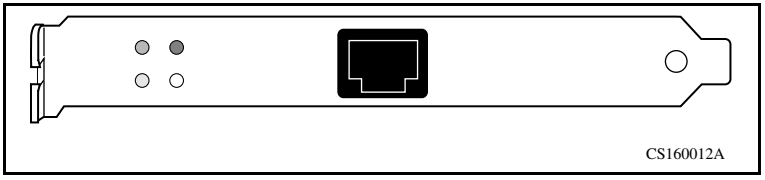
Figure 29 T1/E1 CSU/DSU WAN interface card (half-height card)



Note: For E1 service, you must install the half-height version of the T1/E1 CSU/DSU WAN interface card.

The following figure shows the T1/E1 CSU/DSU WAN interface card (full-height card).

Figure 30 T1/E1 CSU/DSU WAN interface card (full-height card)



The connector on the T1/E1 CSU/DSU WAN interface accommodates an 8-pin RJ-48 modular patch cord. These cables are commonly sold as category 5, or Ethernet, cables.

Note: Nortel does not supply the T1/E1 CSU/DSU WAN interface cable with the WAN interface card.

Use cable that is wired in accordance with EIA-568-A wiring style. This wiring style ensures that a twisted pair inside the patch cord carries the transmit signal (pins 4 and 5) and the receive signal (pins 1 and 2). Nortel strongly recommends that you use professionally manufactured patch cords.

Connect the T1/E1 CSU/DSU WAN interface card to the service provider network by using a straight-through cable or a crossover cable, depending on how the service provider wired the jack:

- For a straight-through connection, you can use a standard category 5 (Ethernet) straight-through cable.
- For a crossover connection, you cannot use a standard category 5 crossover cable. Do not interchange the T1/E1 CSU/DSU crossover cable and the Ethernet crossover cable.

The following table provides the T1/E1 CSU/DSU cable pinouts for a crossover connection.

Table 29 T1/E1 CSU/DSU cable pinouts for crossover connection

Standard-wired end 8-pin male	Signal name	Pair number and conductor	Special-wired end 8-pin male
1	RXDA<-TXDA	wht/org pair 2A	5
2	RXDB<-TXDB	orange pair 2B	4
3	Not used	wht/grn pair 3A	3
4	TXDB->RXDB	blue pair 1B	2
5	TXDA->RXDA	wht/blu pair 1A	1
6	Not used	green pair 3B	6
7	Not used	wht/brn pair 4A	7
8	Not used	brown pair 4B	8

The cable operates properly if you do not connect pins 3, 6, 7, and 8.

Caution: For crossover connections, do not use Ethernet cable. If you use Ethernet cable, the T1/E1 CSU/DSU does not work to specifications, and this condition can corrupt data.

The following table provides the T1/E1 CSU/DSU cable pinouts for a straight-through connection.

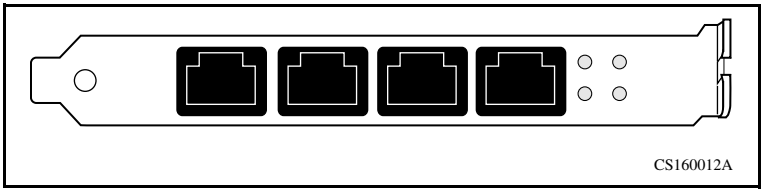
Table 30 T1/E1 CSU/DSU cable pinouts for straight-through connection

Nortel termination		Remote termination	
Signal	**Pin # to Pin #**		**Signal**
Receive A (RXDA)	1	1	Receive A (RXDA)
Receive B (RXDB)	2	2	Receive B (RXDB)
Not used	3	3	Not used
Transmit B (TXDB)	4	4	Transmit B (TXDB)
Transmit A (TXDA)	5	5	Transmit A (TXDA)
Not used	6	6	Not used
Not used	7	7	Not used
Not used	8	8	Not used

Quad T1/E1 CSU/DSU WAN interface card

The quad T1/E1 CSU/DSU WAN interface card has four connectors that provide the signals to interface to T1 or E1 equipment. The following figure shows the quad T1/E1 CSU/DSU WAN interface card.

Figure 31 Quad T1/E1 CSU/DSU WAN interface card



Each connector on the quad T1/E1 CSU/DSU WAN interface card accommodates an 8-pin RJ-48 modular patch cord. These cables are commonly sold as category 5, or Ethernet, cables.

Note: Nortel does not supply cables with the quad T1/E1 CSU/DSU interface card.

Use cable that is wired in accordance with EIA-568-A wiring style. This wiring style ensures that a twisted pair inside the patch cord carries the transmit signal (pins 4 and 5) and the receive signal (pins 1 and 2). nortel strongly recommends that you use professionally manufactured patch cords.

Connect the quad T1/E1 CSU/DSU WAN interface card to the service provider network using a straight-through cable or a crossover cable, depending on how the service provider wired the jack:

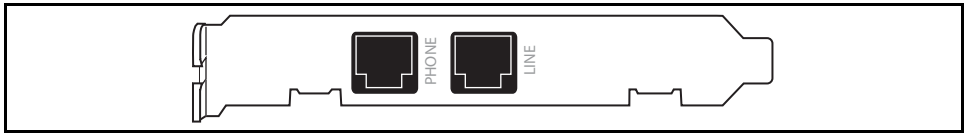
- For a straight-through connection, you can use a standard category 5 (Ethernet) straight-through cable.
- For a crossover connection, you cannot use a standard category 5 crossover cable. Do not interchange the T1/E1 CSU/DSU crossover cable and the Ethernet crossover cable.

For information about the cable pinouts for a crossover connection, see "T1/E1 CSU/DSU cable pinouts for crossover connection" on page 88. For information about the cable pinouts for a straight-through connection, see "T1/E1 CSU/DSU cable pinouts for straight-through connection" on page 89.

V.90 modem interface card

The V.90 modem interface card has two RJ-11 connectors that provide the signals to interface to an incoming telephone line and to telephone equipment. The following figure shows the V.90 modem interface card.

Figure 32 V.90 modem interface card



Included in the accessory box is a 7-foot RJ-11 cable to attach to a telephone jack.

The following table provides the V.90 modem port cable pinouts.

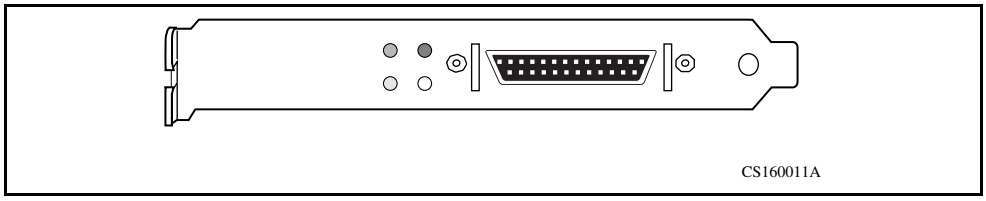
Table 31 MV.90 modem cable pinouts

Pin	Function
1	N/C
2	Tip
3	Ring
4	N/C

Single V.35/X.21 WAN interface card

The single V.35/X.21 WAN interface card has a single DB28S connector that provides the signals to interface to V.35 and X.21 equipment. The following figure shows the single V.35/X.21 WAN interface card.

Figure 33 Single V.35/X.21 WAN interface card



You need a DSU/CSU between the WAN connection and the gateway. You can order a V.35 or X.21 cable to attach to the connector. With this cable, the WAN adapter can function as data terminal equipment (DTE).

"V.35 cable pinouts" on page 91 provides the V.35 cable pinouts. "X.21 cable pinouts" on page 94 provides the X.21 cable pinouts. (The pair suffix A or B refers to an individual wire within a twisted pair.)

Table 32 V.35 cable pinouts

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Special-wired end 34-pin male	Notes
2	TXDA	Pair 1A	P	
14	TXDB	Pair 1B	S	

Table 32 V.35 cable pinouts (continued)

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Special-wired end 34-pin male	Notes
3	RXDA	Pair 2A	R	
16	RXDB	Pair 2B	T	
15	TXCA	Pair 3A	Y	
12	TXCB	Pair 3B	AA	
17	RXCA	Pair 4A	V	
9	RXCB	Pair 4B	X	
24	SCTEA	Pair 5A	U	
11	SCTEB	Pair 5B	W	
4	RTSA	Pair 6A	C	
19	RTSB	Pair 6B	No conn	The term No conn means the wire does not connect to a pin in the 34-pin connector.
5	CTSA	Pair 7A	D	
13	CTSB	Pair 7B	No conn	The term No conn means the wire does not connect to a pin in the 34-pin connector.
6	DSRA	Pair 8A	E	
22	DSRB	Pair 8B	J	
20	DTRA	Pair 9A	H	
23	DTRB	Pair 9B	No conn	The term No conn means the wire does not connect to a pin in the 34-pin connector.
8	DCDA	Pair 10A	F	
10	DCDB	Pair 10B	No conn	The term No conn means the wire does not connect to a pin in the 34-pin connector.
18	LL	Pair 11A	L	
21	RL	Pair 11B	N	
25	TM	Pair 12A	NN	

Table 32 V.35 cable pinouts (continued)

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Special-wired end 34-pin male	Notes
26	M0<-SIGNAL GROUND	Pair 12B	B	Wires 12B, 13A, and 14B connect to pin B in the 34-pin connector.
27	M1<-SIGNAL GROUND	Pair 13A	B	Wires 12B, 13A, and 14B connect to pin B in the 34-pin connector.
28	M2	Pair 13B	No conn	The term No conn means the wire does not connect to a pin in the 34-pin connector.
1	SHIELD	Pair 14A	A	At each end, the cable shield and connector shell must connect respectively to pin A of the 34-pin connector and pin 1 of the standard 28-pin connector. Do not connect Shield to Signal Ground because these are separate signals.
7	SIGNAL GROUND	Pair 14B	B	Wires 12B, 13A, and 14B connect to pin B in the 34-pin connector. Do not connect Shield to Signal Ground because these are separate signals.

The following table provides the X.21 cable pinouts. (The pair suffix A or B refers to an individual wire within a twisted pair.)

Table 33 X.21 cable pinouts

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Standard-wired end 15-pin male	Notes
2	TXDA	Pair 1A	2	
14	TXDB	Pair 1B	9	
3	RXDA	Pair 2A	4	
16	RXDB	Pair 2B	11	
15	TXCA	Pair 3A	6	
12	TXCB	Pair 3B	13	
17	RXCA	Pair 4A	Pair 5A	Wires of pair 4 connect to wires of pair 5, but not to pins in the DA-15.
9	RXCB	Pair 4B	Pair 5B	Wires of pair 4 connect to wires of pair 5, but not to pins in the DA-15.
24	SCTEA	Pair 5A	Pair 4A	Wires of pair 4 connect to wires of pair 5, but not to pins in the DA-15.
11	SCTEB	Pair 5B	Pair 4B	Wires of pair 4 connect to wires of pair 5, but not to pins in the DA-15.
4	RTSA	Pair 6A	3	
19	RTSB	Pair 6B	10	
5	CTSA	Pair 7A	5	
13	CTSB	Pair 7B	12	
6	DSRA	Pair 8A	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
22	DSRB	Pair 8B	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.

Table 33 X.21 cable pinouts (continued)

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Standard-wired end 15-pin male	Notes
20	DTRA	Pair 9A	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
23	DTRB	Pair 9B	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
8	DCDA	Pair 10A	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
10	DCDB	Pair 10B	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
18	LL	Pair 11A	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
21	RL	Pair 11B	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
25	TM	Pair 12A	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
26	M0	Pair 12B	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
27	M1	Pair 13A	No conn	The term No conn means the wire does not connect to a pin in the 15-pin connector.
28	M2<-SIGNAL GROUND	Pair 13B	8	Wires 13B and 14B connect to pin 8 in the 15-pin connector.

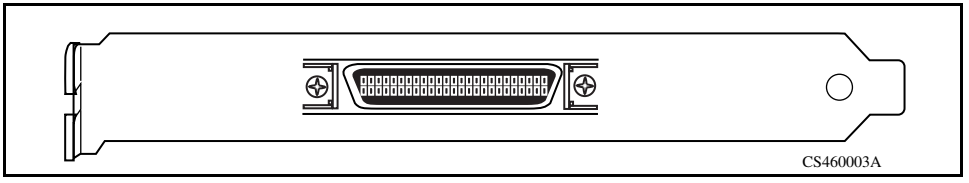
Table 33 X.21 cable pinouts (continued)

Standard-wired end 28-pin male	Signal name	Pair number and conductor	Standard-wired end 15-pin male	Notes
1	SHIELD	Pair 14A	1	At each end, the cable shield and connector shell must connect to pin 1 of the connector. Do not interconnect Shield to Signal Ground because these are separate signals.
7	SIGNAL GROUND	Pair 14B	8	Wires 13B and 14B connect to pin 8 in the 15-pin connector. Do not interconnect Shield to Signal Ground because these are separate signals.

HSSI WAN interface card

The HSSI WAN interface card has a 50-pin SCSI II female connector that provides the signals to interface to a T3 modem or modem eliminator. The following figure shows the HSSI WAN interface card.

Figure 34 HSSI WAN interface card



Included in the accessory box is a cable that maps the T3 signals out to a 50-pin SCSI II male connector.

The following table provides the T3 cable pinouts.

Table 34 T3 cable pinouts

50-pin SCSI male	Signal name	50-pin SCSI male
1	GND	1
2	RCB	2

Table 34 T3 cable pinouts (continued)

50-pin SCSI male	Signal name	50-pin SCSI male
3	CAB	3
4	RDB	4
5	LCB	5
6	STB	6
7	GND	7
8	TAB	8
9	TTB	9
10	LAB	10
11	TDB	11
12	LBB	12
13	GND	13
19	GND	19
24	TESTB	24
25	GND	25
26	GND	26
27	RCA	27
28	CAA	28
29	RDA	29
30	LCA	30
31	STA	31
32	GND	32
33	TAA	33
34	TTA	34
35	LAA	35
36	TDA	36
37	LBA	37
38	GND	38
44	GND	44
49	TESTA	49
50	GND	50

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